

Radio Control **CAR ACTION**

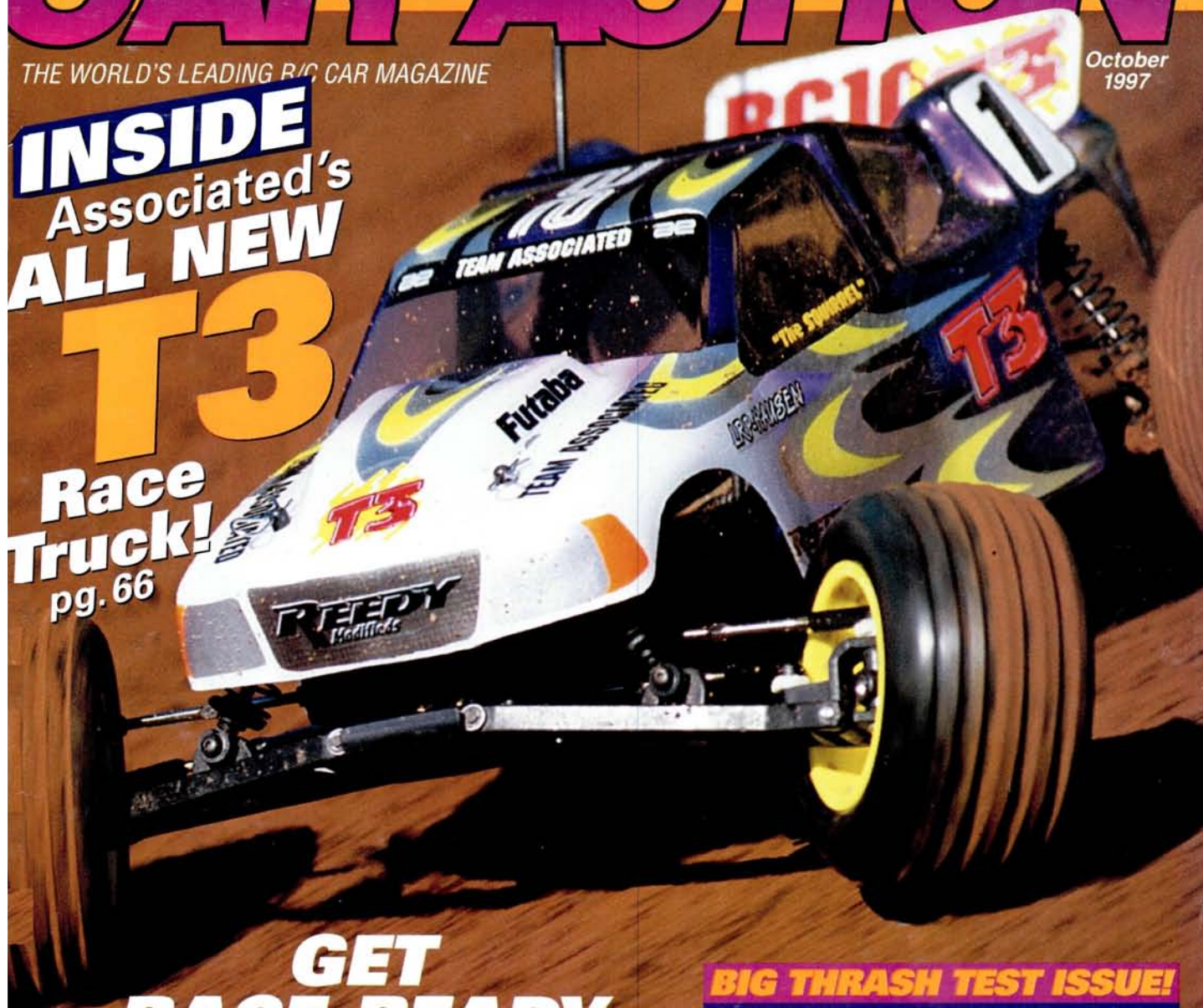
THE WORLD'S LEADING R/C CAR MAGAZINE

Traxxas **TRX-4**
TOURING CAR

October
1997

INSIDE
Associated's
ALL NEW
T3

**Race
Truck!**
pg. 66



**GET
RACE-READY**
How to tune & rebuild
your off-road ride

BIG THRASH TEST ISSUE!

Traxxas Nitro Rustler
MRC Vortex
Yokomo YR-4 II
Tech Racing Voggerd T-10



Road Rage!

THE HOTTEST ON-ROAD RACING ACTION!

**IFMAR 1/8-scale
WORLDS**

**ROAR On-Road
NATS**

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Radio Control CAR ACTION

VOLUME 12, NUMBER 10 • OCTOBER 1997

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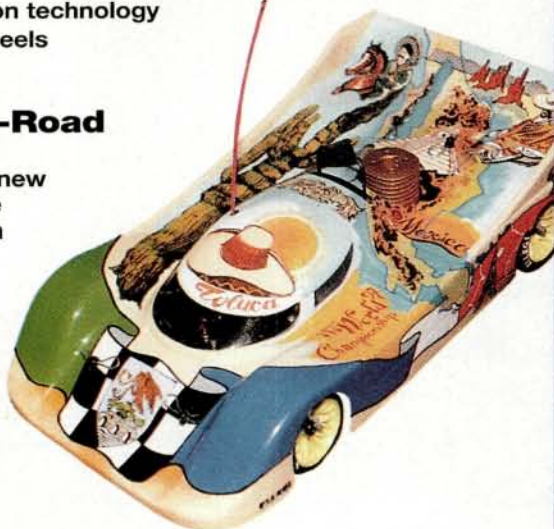
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by George M. Gonzalez

ON THE COVER: Team Associated's newest endeavor, the T3, tears it up for Doogie's Nikon. Below: a glimpse of some insane 1/8-scale action at the IFMAR Worlds in Mexico—caught on film by George M. Gonzalez.

ON THIS PAGE (left, top to bottom): Traxxas' new Nitro Rustler kicks it sideways; the MRC Vortex plays in the dirt; and the Yokomo YR-4 II and the Tech Racing Voggerd T-10 hit the pavement running (photos by John Howell). (center) George M. Gonzalez captured this beauty while at the IFMAR Worlds.

EDITORIAL

R/C racing has become pretty darn sophisticated



during the past five years, but despite all the high tech used in other scales, 1/8 gas racing still takes the technology cake. In fact, if I wanted to impress an uninitiated acquaintance, I'd take him to the IFMAR 1/8 On-Road World Championships. Where else would you find computerized, onboard telemetry, laptops in every pit area and refueling equipment that would make a NASCAR pit crew envious? This summer marked the 11th running of the 1/8 world champs (known to many as the "Formula 1" of R/C), and that makes it the oldest world championship event in R/C racing.

On a par with its long-standing reputation for high tech is the 1/8 Worlds' history of dramatic finishes and colorful champions. This year's event was no exception. Reigning world champion Lamberto Collari from Italy won his fourth consecutive title in '95 with a new Serpent car. Would he do it again in '97? Would the American team—comprising such talent as Mike Swauger and Chris Tosolini—regain its former fame and steal the limelight from the dominant Europeans? How would the high altitude of the Central America track affect the performance of the 3.5cc engines? We sent George Gonzalez to the picturesque R.C. Club Pegaso facility in Mexico City, Mexico, to document what is truly the most exotic and colorful race in all of the R/C world. George found friendly folk, intense competition, Aztec culture ... and perhaps even love! Read his south-of-the-border tale, and view the world from behind the transmitter of a 70mph road rocket.

Visit the *Car Action* website at
<http://www.airage.com>

■ We've also packed this issue with the very latest in high-tech kits. Japan originated the touring-car craze, and we test two of the newest electric sedans from the Land of the Rising Sun. Tech Racing's Voggerd has been making headlines in Japanese R/C mags lately, so we naturally beat down the door of GTP Racing, Tech's U.S. distributor, for a test sample. Yokomo also sent us one of their new YR-4 II sedan chassis, which has some interesting new features not found on other cars (such as a little shock on the upper plate that supposedly damps harsh bumps). Oh, and don't let me forget to tell you that this issue also contains an in-depth look at the new T3 race truck from Associated and a very, very secret "Inside Scoop" on a new, belt-drive, 4WD touring car from a popular U.S. company. Hint: this company is in the "Everything here is big" state. Until next month, try to stay on all fours!



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Radio Control CAR ACTION

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Help Against the Hop-Ups

We need to do something here. R/C manufacturers are selling us products that are less than satisfactory. To have any possibility of being competitive in races, we must upgrade our cars and trucks with hundreds of dollars' worth of hop-ups. Why don't manufacturers offer a *true* competition-ready vehicle? They make more money selling us hop-ups than they would selling a better car. Could you do something to help our cause? An article in *R/C Car Action* and pressure on the major manufacturers could help our case a lot! Thanks for listening to a concerned fellow R/C'er. **DAVID GOSNELL**
via email

Well, Dave, we agree with the idea that manufacturers should sell "true" competition-ready vehicles, but we think that in most cases, they do in fact sell out-of-the-box competition-ready vehicles. Granted, most racers add a few hop-ups here and there, e.g., titanium turn-buckles and better tires, but in general, the race vehicles sold today are more race-ready than ever before. If you haven't been in the hobby that long, you probably missed the days of the mid-'80s when you literally had to have tons of hop-ups on your car to make it around the track successfully. Today, you

can take a box-stock buggy or truck and hit the track without having to add a ton of extras. Look at '96 ROAR National Mod champ Chris Bing. With his Team Losi Double-X, he TQ'ed and won the championship against factory drivers such as Brian Kinwald, Greg Hodapp and Mark Pavidis. The clincher was that his car was relatively box-stock! The key is practice, David; that makes you a good driver—not parts. —*Doogie*

Where did You get Those Things?

I have an RS4 Pro, and I would like to try the setup you mentioned in your RS4 "2nd Look" (September '96) article. Could you give me Tamiya's part number for the red and blue tuned springs you used? Also, in David Jun's TAO3 setup ("Setup Like the Champs" April, '97) he used "optional yellow speed-tuned springs." Could you also give me Tamiya's part number for these? **CORY MITCHELL**
via email

Cory, you're in luck. Tamiya's On-Road Tuned Spring Set (part no.—53163) comes with three sets of springs: red—soft; yellow—medium; and blue—hard. With this spring set, you'll be able to dial your car in on any track. You might also want to pick up a selection of shock oil while you're at it. —*George*

Love that Nitro RS4

Hey! I read your article on the Nitro RS4, and I liked it so much I bought one. You said that when you got more familiar with the car, you would pass along some setup tips. Is there any way of getting more performance out of the stock engine, besides

the baffle on the tuned muffler? And how about some more setup tips?

ANDREW EKHERT
via email

Andrew, we really like the Nitro RS4, too. As far as getting more performance out of your stock engine goes, here are a few things that you might want to try. First, be sure the engine gets plenty of air cooling. Make the opening in the front windshield and driver's side window as large as you can. If you can get away with it, make an opening in the passenger window as well. Your engine will run cooler and much more consistently.

You can pick up one of HPI's high-performance SS carburetors (no. 1666). This carb has a larger venturi, so it will pump more fuel in the same time as the stock unit. The result: more power. How about HPI's 2-speed tranny (no. A910)? Install one of these, and you'll increase acceleration, top speed and your level of satisfaction. HPI's new exhaust header and tuned pipe will certainly motivate that little .12 engine of yours (nos. A940—tuned pipe; A950—header). Of course, if you install all these items, your car will be hell on wheels.

As for setup tips, a "2nd Look" on the HPI Nitro RS4 is already in the works. You'll just have to wait a couple more months. —*George*

Sappy Pull- Starter

I am having a problem with my Dynamite pull-starter on my GTX. The problem is that the string keeps breaking, and I have to keep changing it. **RICHARD**
via email

Richard, the pull-starter mechanism on your Dynamite engine should be fine. I don't think it's the problem. It sounds as if

you're running your engine a little too rich at start-up, and that's causing it to flood. When you pull the pull-starter cord to start your truck, you should feel a little resistance before the engine goes "pop." If you have to struggle with the starter cord to turn the engine over, there's probably too much fuel in the cylinder head. Never try to start a flooded engine, or you will go through starter cords as they're made of sewing thread.

Try this: remove the glow plug, then turn the engine over a few times to release the excess fuel. Next, install the glow plug (making sure it's tight, but not overly so, and centered on the copper washer). Set your high-end needle valve so it's open 2¼ turns from fully closed. That should put you in the ballpark for starting your engine. Have you messed around with the low-end needle valve adjustment? If you did, turn the screw clockwise until it's fully closed, then open it 1½ turns. Before you restart your engine, toss the old glow plug and install a new one. Now, go do some laps. —*George*

Changing Channels

Would a 2-channel FM receiver (like the Novak Mercury or the new Metal Plated Tekin receiver) work with a 3-channel Futaba 3PDF transmitter? Also, do any companies make a 2-channel FM transmitter compatible with either of those two receivers? **C.P. WAITE**
via email

All the receivers you mention will work just fine with the Futaba 3PDF transmitter. Keep in mind, however, that you must use only Futaba crystals. Hitec makes a new 2-channel FM receiver that is compatible with all the equipment you mention. —*George* ■

WRITE TO US! We welcome your photos, drawings, comments and suggestions. Letters should be addressed to "Letters," Air Age Inc., Radio Control Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the identity of the sender can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

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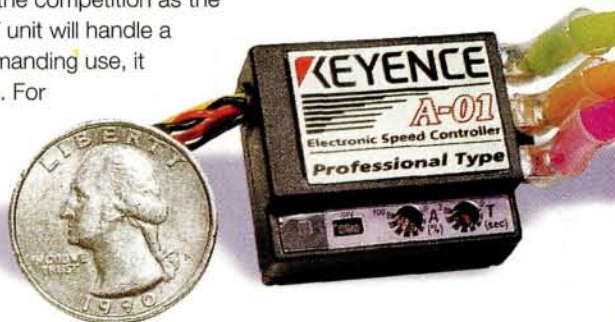
In search of fun
and glory, 'cause
life's too short
to be a sheep • by Chris Chianelli

INSIDE scoop



SIZE **Matters**

Measuring only 1.2x1x0.51 inches, the new Keyence A-01 Pro edges out the competition as the world's smallest, high-frequency electronic speed control. This tiny 16-FET unit will handle a 7-turn killer motor, yet it weighs only 18 grams (without wires). For less demanding use, it doesn't need a heat sink, so it's fantastic for F1 and 1/12-scale applications. For those who aren't familiar with the name "Keyence," it's that of a super-sophisticated high-tech electronics and opto-electronics Japanese manufacturer—an extremely capable company, to say the least. They're the guys who make that awesome, 12-inch-long, fully R/C helicopter called "The Revolor." I hope I'll have lots more information on this company and their entire product line in the very near future. For further information on the Keyence A-01 Pro, contact Mike Huse at (415) 999-0996.

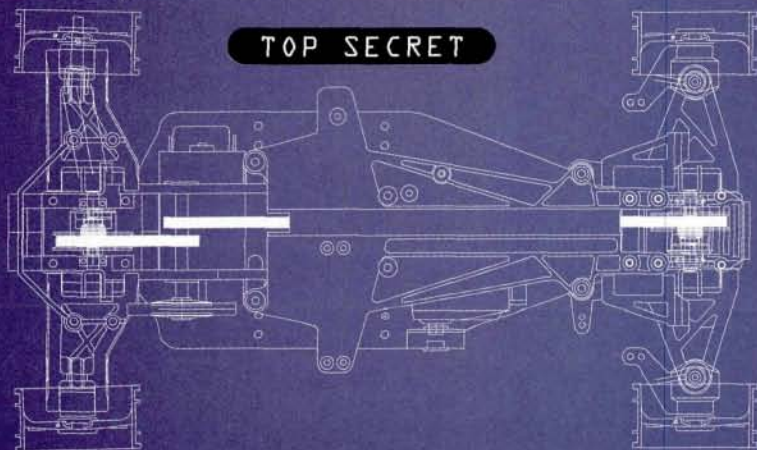


TRAXXAS TRX-4

I did it! I hacked into the Traxxas computer and gained access to their design files. This is an electronically stolen microfilm blueprint of the secret 4WD touring car chassis they've been

working on. Written on the heisted document, there was only a little encoded information, but I'll share it with you. This much is known for certain: it's called the TRX-4 and will incorporate front and rear ball differentials, dual belt drive, slipper clutch, upper and lower molded-composite chassis and a Stinger 20-turn motor. If the car is offered in traditional Traxxas style—I mean affordable and ready to run—they have a real winner here. The secret project does have a release date of sometime in November. Stay tuned to channel WSPY for further communications.

TOP SECRET



Trinity Battles Battery Wars

Trinity's new Sanyo RC-1700 battery may well set a new battery standard for parking-lot and club-style spec racing. The new cell is not a replacement for the 1700-SCRC, but it's a very affordable alternative. The RC-1700's voltage output is less than that of the 1700-SCRC and the RC-2000, but it uses the same technology as the RC-2000, which gives better performance than the old 1400SCRs, yet should cost about the same. The new cell will be suitable for street racers who want longer run times and for casual racers who compete each week for fun. The RC-1700 should be available by the time you read this. For more info, contact Trinity Products, 1901 E. Linden Ave. #8, Linden, NJ 07036; (908) 862-1705; fax (908) 862-6875.



INSIDE scoop

Pro-Line's **NEW SEDAN RUBBER**

One of the biggest news items from the '97 ROAR On-Road Nationals was about the debut of Pro-Line's new rubber compounds—S2 and S3—that have been specially formulated for touring-car tires. Top qualifier in Sedan Modified Barry Baker used Pro-Line's Slicks in the stickier S3 compound, while overall class winner Dave Jun ran Slicks in the medium S2. The new tires will be available in narrow and super-narrow widths.

Pro-Line also unveiled its new Warlock wheels for touring cars. They fit any popular brand of car that uses a Tamiya/Kyosho-style hex adapter. These six-spoke, ultra-rigid wheels (shown here on Barry Baker's TQ YR-4 M2) will be available in three colors (white, black and chrome) and in two widths (narrow and super-narrow).

For more information, contact Pro-Line 201 W. Lincoln St., Banning, CA 92223; (909) 849-9781; fax (909) 849-2968.



MIGHTY MINI

Under this cute little Suzuki Wagon R is HPI's new fire-breathing 4WD Nitro RS-4 Mini. Basically, it's an RS-4 that has been shortened and narrowed to fit "M"-scale bodies like the Tamiya Mini Cooper. This little beast is motivated by .12c.i. glow power and, to quote George Gonzalez, "This thing is silly fast."

TRINITY

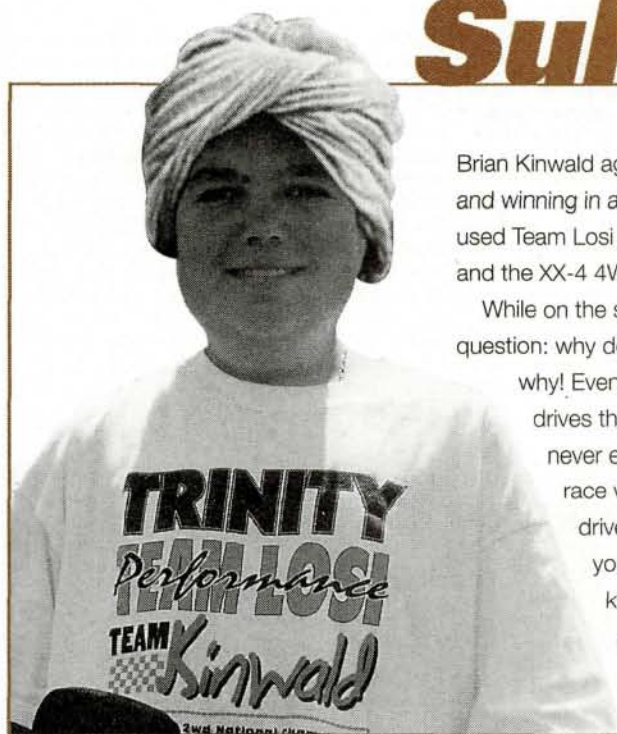
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Our 128
Tooth Spur
Is Lighter Than
Most 100 Tooth
Spur Gears!

Sultan of Smooth



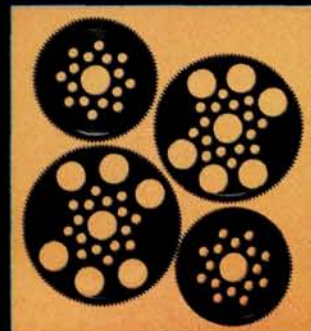
Brian Kinwald again showed why he's called "the Dirtinator" by top qualifying and winning in all three classes at the '97 ROAR Off-Road Nationals. Brian used Team Losi vehicles (Double-X 'CR' 2WD buggy, Double-XT 'CR' truck and the XX-4 4WD buggy) with Trinity motors and batteries.

While on the subject, I would like to pause for a moment and ask this question: why does Brian win so often? Because he doesn't crash, that's why! Even if there's a faster car on the track, Brian still wins. Why? He drives the course methodically, stays on the track, avoids pileups and never ends up in the woods because he suddenly thinks it's a drag-race when he reaches the straightaway. Obviously, all the top drivers do the same; Brian is just extra good at it. I thought all you guys who are hung up on expensive hop-ups needed to know. And "Dirtinator" is an OK name, but I think the "Sultan of Smooth" is far more accurate.

FRICTION

SUPER GEARS

- New Super Low Drag Narrow Tooth Design •
- Graphite Filled For High Tooth Strength •
- Super True, Super Light, Super Quiet •
- 84 & 87 Tooth Sizes For Losi XX-CR & XXT-CR •
- 95, 100, 120, & 128 Tooth For On-road Racing •
- Dual Diff Ball Holes For Stealth & Corally Diffs •





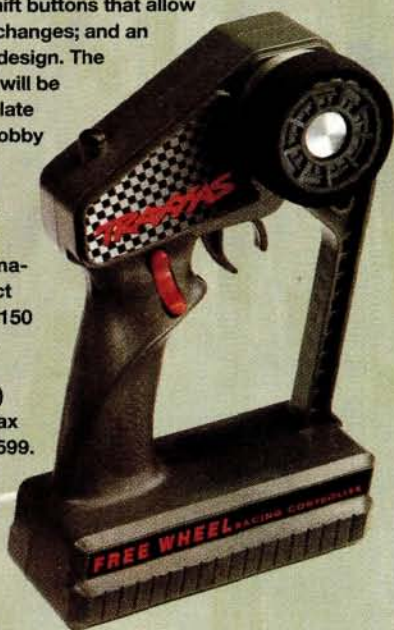
On-Board Mixture-Control

Ever blow a gas race because your fuel mixture went too rich and you lost the mid-range punch that's so important coming out of the turns? Worse yet: ever ruin an engine because it went a bit too lean and you raced an entire heat unaware that important components (like your piston and sleeve) were getting a bit too hot? According to PC/RC, with their new EFR-801, you will never again experience a lean or rich mixture. Mounted in your car, this unit constantly monitors exhaust temperature and makes appropriate mixture adjustments within milliseconds of sensing a temperature fluctuation. I'm told that the micro-computer samples the temperature thousands of times per second. The EFR-801 can be programmed to ensure that fuel mixture is maintained throughout the engine's entire throttle range. The EFR-801 weighs less than 1.5 ounces and is easy to install. The electronic fuel regulator valve dimensions are $\frac{1}{4} \times \frac{1}{4} \times 1\frac{1}{4}$ inches while the micro-computer control box measures only $\frac{1}{4} \times 1 \times 1\frac{1}{2}$ inches. The temp sensor is approximately the size of a muffler pressure fitting and is mounted in the exhaust header/muffler as close as it can be to the engine's exhaust port.

This thing could save untold numbers of expensive engines while at the same time helping to win races! I hope the price will be right. I'll keep you posted. For more information, contact PC/RC, 13807 Amiot Dr., Ste. D, St Louis, MO 63146; (800) 646-9383; fax (314) 878-0461.

Traxxas crosses over to PC gaming

Traxxas has developed the Free Wheel—a racing controller designed for use with all types of PC racing games, including *NASCAR Racing II* and *Grand Prix II*. It can be connected to the PC and set up in the same way as a typical two-axis, two-button joystick. Features include proportional, fingertip steering control; proportional throttle and brake trigger; rapid-fire shift buttons that allow quick gear changes; and an ergonomic design. The Free Wheel will be available in late August at hobby shops and computer/electronics stores. For more information, contact Traxxas, 12150 Shiloh Rd., Dallas, TX 75228; (972) 613-3300; fax (972) 613-3599.



GTs from Dahm's

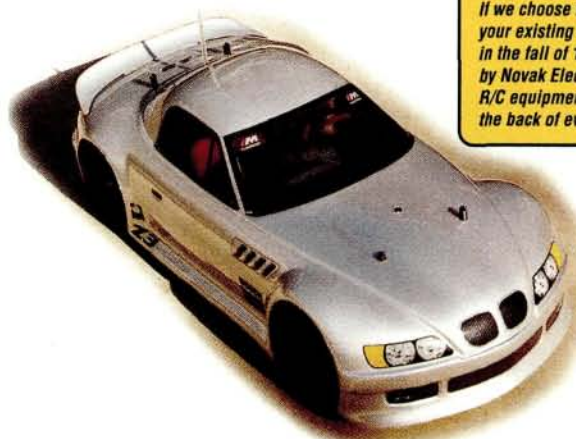


Dahm's new Spice GTP body (above) fits the HPI RS4 (wide setting) as well as narrow $\frac{1}{10}$ -scale superspeedway cars like the Associated RC10LSS and Trinity EV10SS. It features: low, narrow, aerodynamic styling; a GTP wing with optional large stabilization fins; several scoops and vents that can be opened to make them functional; fine detailing; Dahm's decals; and complete instructions. Also shown is Dahm's 911/GT1 Porsche (below) with wing for wide (200mm) Tamiya, HPI, and Kyosho-style sedan chassis. To keep them light and strong, both bodies are made of 0.030 GE Lexan.

For more information, contact Dahm's Racing Bodies, P.O. Box 360, Cotati, CA 94931; (707) 792-1316; fax (707) 792-0137.



"Readers' Rides" is our way of recognizing the unique, innovative—and sometimes bizarre!—vehicles that our readers have created. Send a sharp, uncluttered, well-exposed color photo of your car or truck (no Polaroids, please!), along with a brief description, to Readers' Rides, R/C Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. If we choose to feature your creation, you'll receive a 6-month subscription to Car Action, or an extension of your existing subscription. You'll also be eligible for the seventh annual "Readers' Rides of the Year Contest" in the fall of 1997. The winner will be awarded \$500 and an assortment of electronic R/C equipment furnished by Novak Electronics Inc. Our second and third choices will also receive an assortment of Novak electronic R/C equipment. In case we need to contact you, write your address and phone number on your letter and on the back of every photo you send. Good luck!



STOCK '02

Chris Putnam of Eltham, Australia, races his stock Tamiya TA02 at Templestowe Flat Track Racing Club, where he came in second in the stock class in the state of Victoria in 1996. He gets his sedan going with Midnight and Phantom motors and lets the power meet the ground with HPI Dodge Viper rims and Super Radial tires; he looks stylish with this HPI BMW Z3 roadster body.

1/8-SCALE ACTION

There's no disputing it: 1/8-scale gas is back on the R/C scene, and Ryan Morrissey of Huntington, NY, is leading the pack with his OFNA Ultra Worlds GT. He's equipped it with Thunder Tiger's PRO ABC .21 engine, through which he runs Blue Thunder fuel; he controls his ride with Futaba Magnum 2PD radio gear. Ryan is so pleased with the buggy's stock performance that he's not planning any modifications in the near future.



MOSTLY MODIFIED

Adrian Duran of Corpus Christi, TX, sent in this photo of his heavily modified Losi Double-XT. Suffice it to say the only stock parts are the front body mounts and spindles. Some of the cooler performance improvements Adrian has made include: Lunsford turnbuckles, hinge pins, topshaft and Fat Boys motor screws, Losi graphite upgrades everywhere, Boca bearings, titanium screws all around, Losi white and gray springs, MIP gold shock shafts, graphite pinion and spur gears, Litespeed connectors and Kinwald countersunk washers. Coupled with Pro-Line Bow Tie and Edge tires, Futaba radio gear and ESC and a Trinity D2 13-turn motor, Adrian's truck is a certain A-mainer!

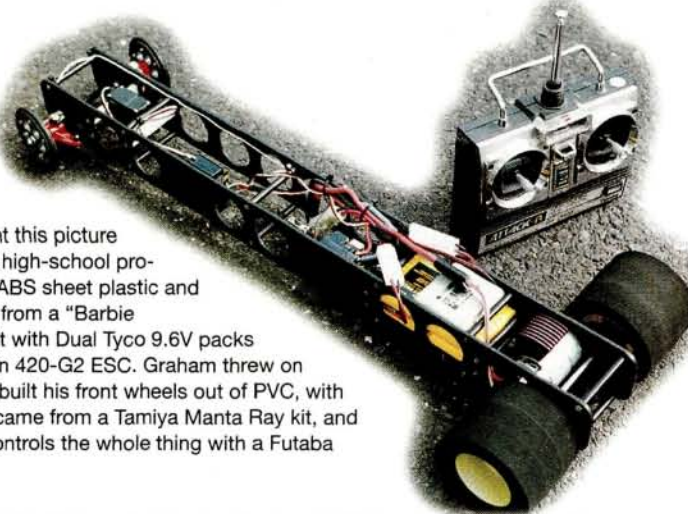
COOL CONVERSION

Pat Mancuso of Bronx, NY, converted his Kyosho Inferno into this Esprit and added a lot more goodies. In addition to the kickin' Alfa 155 body, he hopped it up with a Paris Picco P5-EXR engine with Paris pipe, a one-way center diff with steel main gear, aluminum center-diff housing with front and rear chassis stiffeners, titanium hinge pins, full ball bearings and dual fiberglass disk brakes. Pat controls it with Futaba 9304 servos and an Airtronics Caliber 3Ps radio system.



BUDGET HOMEBUILT DRAGSTER

Fifteen-year-old Graham Clark of Oreland, PA, sent this picture of the drag car he designed and built himself as a high-school project. He started with a chassis scratchbuilt out of ABS sheet plastic and Delrin rod, added a stock Mabuchi RS-550 motor from a "Barbie Lamborghini Powerwheels" ride-on car, powered it with Dual Tyco 9.6V packs wired in series for a total of 19.2V and used a Tekin 420-G2 ESC. Graham threw on Ellegi 1/8-scale (gas) foam doughnuts in back and built his front wheels out of PVC, with homemade O-rings for front tires. The front hubs came from a Tamiya Manta Ray kit, and the rears were constructed out of nylon rod. He controls the whole thing with a Futaba 2-channel AM radio with a S148 servo.



FATHER AND SON OPELS

Paul Gorman and his son Jason of Cape Town, South Africa, own these two differently scaled Opel Calibras. Dad's 1/5-scale FG Opel Calibra is fitted with a single-shock front end, disk brakes on all four wheels, Teflon™ clutch and many aluminum components, including motor mounts and drive gears. It also features a great-looking carbon-fiber rear wing. Jason's Tamiya 1/10-scale Opel races in the stock class but is outfitted with a GPM carbon chassis set and GPM aluminum suspension components and it's topped off with a Novak Cyclone speed control, Trinity X-Star motor and Futaba servo with FM receiver.

INSANE PERFORMER

Daniel Wilson of Oklahoma City, OK, likes to do some crazy stunts with his smokin' Losi Double-XT; we've seen the pictures! He says his ride has suffered some "bumps, bruises, gashes and third-degree burns" in the process; nevertheless, it has always managed to land with its wheels on the ground. For great off-road and mid-air performance, Daniel has equipped his truck with a Novak Racer ESC, a Litespeed stock motor, titanium tie rods and Sanyo batteries; he controls it with Futaba Mag Jr. radio gear.



"TRIO OF TERROR"

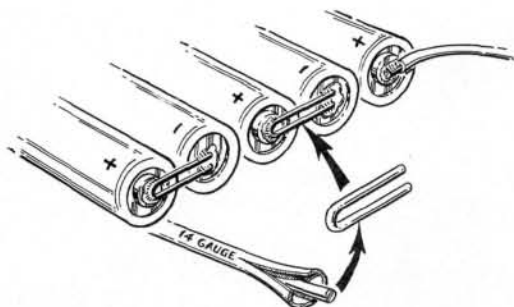
These trucks have more mods than their owner, David Monson of Willmar, MN, even dares mention. The Clodbuster (left) and MRC MT-10M (right) are controlled by Airtronics radio systems, and the Tamiya Prerunner (center) is controlled by a Futaba system. David has modified each truck for a specific purpose. The Clodbuster is "ready for trail-blazing power and hill climbing," the MT-10M is built for extreme speed and the Prerunner can perform all three functions! Looks like a great collection, David.





PIT TIPS

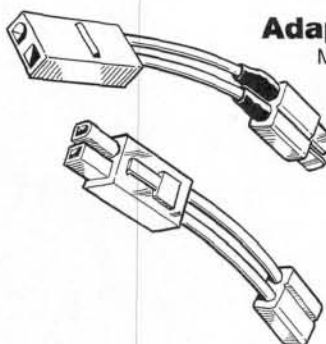
by Jim Newman



Behind Bars

Make inexpensive battery bars by stripping the insulation from scrap no. 12 or no. 14 copper house wiring; bend it double before you solder it across your battery pack's terminals. Clean the wire and terminals with fine sandpaper; use at least a 60-watt iron and acid-free rosin (the type used for electrical work).

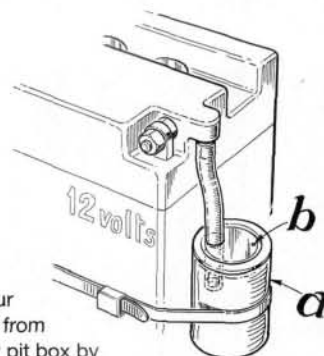
DAVID SMITH,
Manchester, England



Adaptable

Make adapters with a variety of plugs on their ends so that, in an emergency, you'll be able to exchange batteries and equipment with friends.

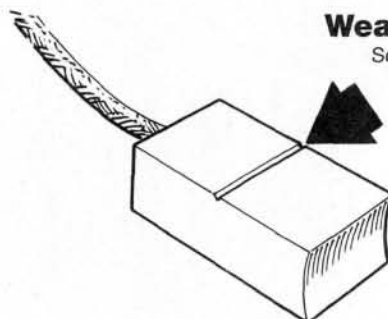
JOSE RODRIGUEZ, Chicago, IL



Acid Trap

Keep acid from your 12V starter battery from splashing into your pit box by forcing the vent tube into a plastic, 35mm film canister (a). Make a tiny vent hole (b) with a pin.

BRANDON BONNER, Deltona, FL



Wear Indicator

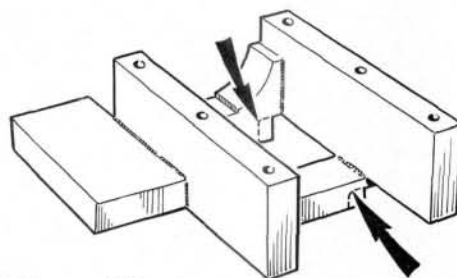
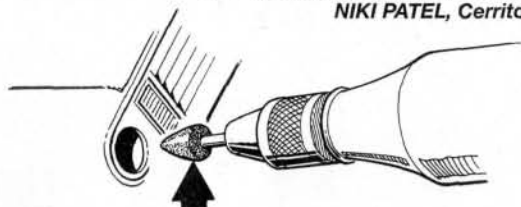
Scratch a mark across your motor brushes wherever you feel they will wear out. When the mark appears through the brush holder, it is time to replace the brushes.

JAY BIGLOW, Lynchburg, VA

A Real Grind

Use a no. 652 or similar-size Dremel grinder to open out holes and trim body shells.

NIKI PATEL, Cerritos, CA



CZ-R Gear Mesh

Grind about 3 or 4mm from the engine-mount areas indicated to allow the engine to be mounted farther back. This will provide the space necessary for proper gear mesh when you use an 18-tooth—or smaller—pinion. To avoid cracking the mount, make sure the corners are rounded where parts of the mount areas have been ground away.

MASON HOLMES, Beverly, WV

Radio Control Car Action will give a one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send a rough sketch to Jim Newman, c/o Radio Control Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. We're unable to publish many of the good tips we receive because we don't have the sender's name and address. Please note: because of the number of ideas we receive, we can neither acknowledge every one nor return unused material.



Get your off-roader into racing shape

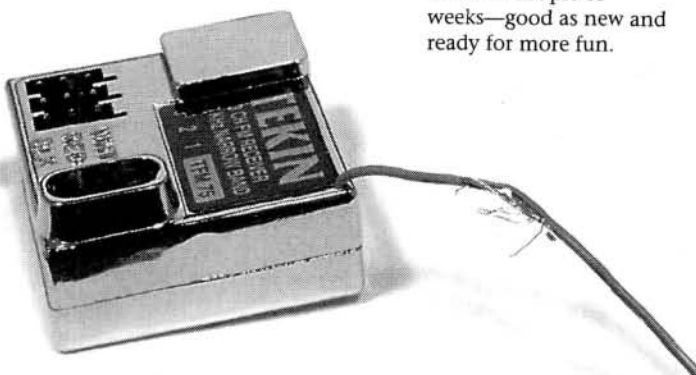
LOTS OF bad things can happen to your off-road equipment if it sits around for a couple of months. It isn't just the dust and grime left over from the last event that have to be cleaned up; it's the bent stuff you don't know about, the hidden corrosion and the broken or worn-out parts that you have to be concerned about. If you've neglected your equipment, follow along as I go over a truck and buggy and get them ready for the local off-road racing scene.

ELECTRONICS

This is a good time to check out your transmitter and receiver crystals. Did you have an inordinate number of glitches or "hits" while using one particular frequency? If you did, replace the crystals now, not when you're on the drivers' stand wondering why your car jumps and jitters all over the place. I usually find that the receiver crystal is the problem due to the number of wallops it receives during normal use.

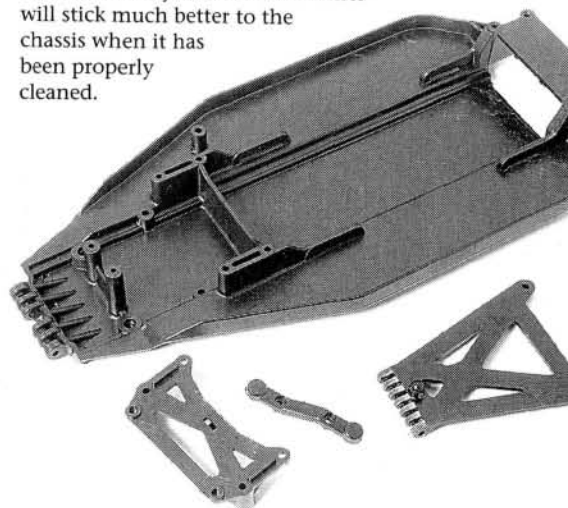
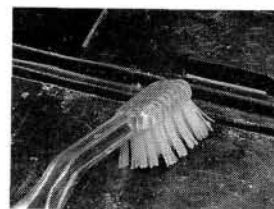


How about that speed control and receiver? Are you using a speed control you took from another vehicle, and did you have to increase the length of the motor wires or battery wires? Is your receiver antenna wire chafed or bare in spots? Now is a good time to consider maintenance for these items. You may not want to be without your receiver or ESC during the racing season, so send them to the manufacturer's repair shop when you know you'll have a little downtime. Electronics firms such as Tekin*, Novak*, Futaba* and others can usually get your electronic components back to you within a couple of weeks—good as new and ready for more fun.



CHASSIS

When you've removed the electronic components from the chassis, clean it. A stiff, dry paintbrush is still your best bet for removing dust and thick crud. Clean the chassis with motor spray or denatured alcohol. Your newly restored electronics will stick much better to the chassis when it has been properly cleaned.



Next, remove the suspension parts, and inspect the chassis for cracks, chips, warping and wear patterns. Repair or replace it now—not halfway through the season. If you need a new chassis, they're relatively cheap, so go for it. You'll often find small cracks near the suspension-arm and transmission-mount holes. You'll never find these problems while the suspension is mounted because they're hidden by screw heads and suspension components.

To see whether they're still straight, check the hinge pins by rolling them on a flat surface such as a tabletop or a pane of glass. If they wiggle as they roll, straighten them with a vise and good slip-joint pliers, or better yet, replace them with new ones. If they're almost straight, polish. Hold them in a drill or Dremel* tool, turn it on, and polish the pins with fine 600-grit wet/dry sandpaper or metal polish. Your suspension arms will work much more smoothly with clean, straight, shiny hinge pins.

While you're at it, go ahead and splurge: replace *all* of the E-clips. They don't cost much, and if they fail because of stress, or jump off, or cause you to lose a race when the hinge pin drops out, you'll be really upset.





New rod ends or nylon cups on your turnbuckles will ensure that these links stay where they're supposed to—even when you land upside-down while trying to clear the triple jumps. Before you reinstall your turnbuckles, make sure they are straight. If you don't have titanium turnbuckles and your stock ones are bent, now might be the time to upgrade; they should last for the life of your car or truck.

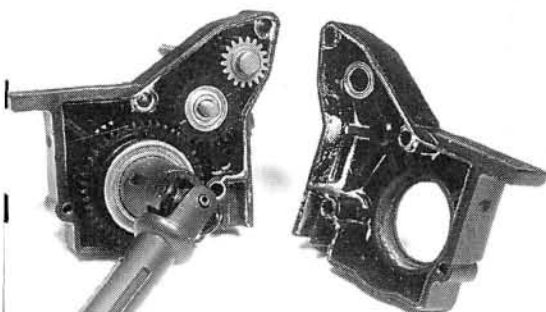


Check the general fit and finish of all the support components on your ride. Run the wheels through their entire travel range—to the left, right, up and down—to make sure that nothing interferes with smooth performance.

As you remount the suspension components, check every arm, mount and hub carrier for stress cracks and breaks. Look at the head and threads of every screw, nut and bolt.



Don't take a shortcut and use a screw with a head that's almost stripped out or a nut with rounded corners. Replace them now. I guarantee that the screw with the sloppy head slot or the nut with the corners that don't look quite right will be the one that strips out at the most inconvenient time!



Do you need to rebuild your differential or transmission? Check out Frank Masi's excellent transmission rebuilding article in the February '96 issue of *Car Action* for more details on this important maintenance procedure.



MOTORS AND BATTERIES

If you run in the modified class, now is a good time to true the commutators on all your modified motor armatures. How about stock? There's a new batch of stock motors out there! Are you stuck with last year's motor technology (or the year before's)? Find someone who can clean your motor and cut the commutator to ensure maximum motor performance and longevity. Replace the brushes and springs, and you'll be ready to hit the track. If you wait until the action starts, you'll be asking people to help you out when they're trying to win races. That's not a good way to make friends!

What kind of shape are your batteries in? Are last year's packs looking pretty tired—bare wire between the cells and the connectors? Do you need to stock up on a couple of new packs? Maybe you should have your cells re-matched, especially if you've been using them for a couple of years. At the very least, examine them carefully, re-shrink-wrap them, if necessary (battery shrink-wrap is available by the foot from most hobby shops), and replace or clean the connectors.

(Continued on page 46)



The Pit Wizard Casts its Spell

The latest device from Team Novak to enchant R/C enthusiasts combines technology with convenience and amazingly fits in the palm of your hand.

The **Pit Wizard**, a hand-held programming device, allows users to create their own ESC Profiles in the Cyclone ESC.

Get a Grip!

The handiness of the **Pit Wizard** relieves users of carting a computer to the track, while allowing the same programming capabilities.

Want a higher Drive Frequency to help make your car easier to drive on slippery surfaces? How about a lower Drive Frequency to help get the most out of that stock motor? **16 Drive Frequencies** offer a wide range of options for any driving situation.

9 More Possibilities

Other adjustable Cyclone parameters that can be accessed by the Pit Wizard include: **Deadband, Brake Frequency, Minimum Drive, Drag Brake Value, Drag Brake Frequency, Full Throttle, Full Brake, Neutral and Drag Brake Toggle.** The Pit Wizard also allows the transmitter's throttle trigger position to be monitored.

A proven winner, the **Pit Wizard** (#1035) captured all three National titles and nearly 70% of all the A-Mains at the 1997 ROAR Modified Off Road Nationals. It is truly the most comprehensive electronic tuning package available for R/C vehicles.

NOVAK ELECTRONICS, INC.
18910 Teller Avenue, Irvine, CA 92612
• (714) 833-8873 •

Advertisement

TS#44



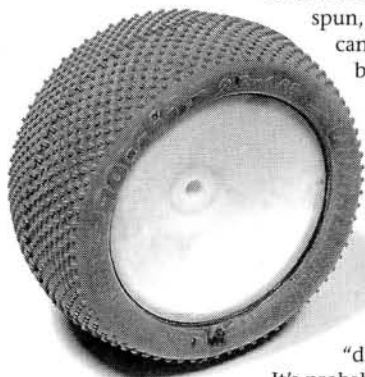
(Continued from page 43)



BEARINGS AND TIRES

Remove all the bearings from the wheels, spindles, or hub carriers, and clean them carefully. Use a commercially available bearing cleaner like the ones sold by Robinson Racing*, or spray them repeatedly with motor cleaner, rotating them as you spray. Allow the bearings to dry, and then lube them with a good-quality bearing oil such as AeroCar's* bearing lube, Mobil 1, or BRP's*

Black Gold. If a bearing feels rough when it's spun, it may be replacement time. If you can't afford to immediately replace a bearing that spins roughly, put the nastiest ones where you can easily reach them, like in the outside of the hub carriers. If you do that, you'll be able to get to them easily when you have the bucks to replace them.



Take a really close look at your tire sidewalls. The treads or spikes may not look worn out, but the sidewall may have "dry-rotted" during the off months.

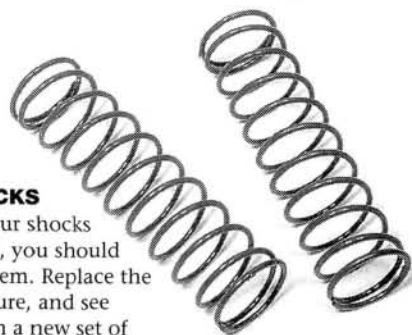
It's probably a good idea to store your tires in an airtight plastic container. This will not only protect them from drying out, but it will also prevent the dirt on your tires from spreading all over the inside of your track bag.

SHOCKS

Even if your shocks don't leak, you should rebuild them. Replace the seals for sure, and see how much a new set of pistons will cost. Are the shock shafts still straight? Check them just as you checked the hinge pins; bent shock shafts won't give you smooth action on the track.

Toss your nasty, old containers of shock oil, and pick up a couple of fresh bottles. I always try to buy my shock oil from the same manufacturer. Trinity*, Associated*, Losi* and other companies make excellent silicone-based shock fluids that won't thicken when it's cold or thin when the temperature soars. You'll find it much easier to tune your truck or buggy if your shock oil all comes from the same source.

Have your shock springs started to sag? Are they all the same length? Take a minute to measure them now! You won't think of this between heats when you're trying to figure out why the car handles oddly.



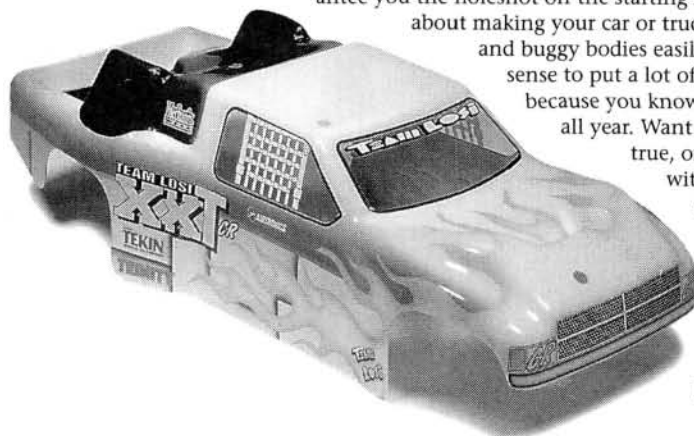
LEXAN

Now that you've straightened the chassis, smoothed the suspension, obtained all the proper tuning aids and ensured that your motors and batteries will absolutely guarantee you the holeshot off the starting line, it's time to think

about making your car or truck look good. Most truck and buggy bodies easily last a season, so it makes sense to put a lot of work into a new body, because you know that your efforts will last all year. Want a really kickin' body with

true, one-of-a-kind Lexan artwork without any painting effort

on your part? Contact Scot Bich at Bich'n Bodies*, or Rich Muise at Motion Graphics*, or check out your local hobby shop or track to see what the local airbrush experts are putting out.



THE GRAND FINALE

By the time you've finished this project, you'll really be ready to hit the dirt. Not only will your car or truck be well-prepared for a new season of fun, but you'll be pumped up and ready to drive it, too. The pros regularly strip their cars down to the bare chassis and really examine every individual component. They're intimately familiar with the condition of all of the parts that make up their winning rides, so they have the confidence to head to the track ... and the winners' circle!

*Addresses are listed alphabetically in the Index of Manufacturers on page 200. ■



TRUBLE SHOOTING

by Doug Mertes

Rear Tire Blues

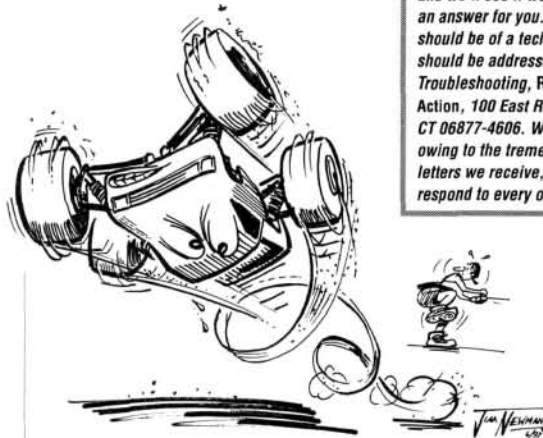
I've been having a lot of trouble with my Team Losi Double-XT, but there's one problem I can't quite figure out. Whenever I try to run my car at full throttle, the right rear wheel shakes like crazy. I've tried putting bearings in the back wheels and mounting new rear tires, and I've lubed all the transmission bushings, but it still happens. Please help me out before I go crazy!

DAN BROX
Ridgefield, WA

Wheel and tire vibration is always hard to diagnose, but it's even more frustrating when you're dealing with the large, heavy tires used on big racing trucks. Since you've eliminated the possibility that worn bushings or tranny parts are causing the problem, I would take a close look at the rear wheels themselves; specifically, the inside face that contains the drive-pin groove. If the pin groove is all chewed up, then you've located the source of your trouble: when you bolted the wheel onto the axle, the drive pin was not situated properly in the groove. If this is the case, you'll have to replace the rear wheels because once the groove has been enlarged, there's no way to make it the correct size again. If the wheel isn't scarred, pull out the drive shafts and check to see whether they're bent. This is easily done by rolling the drive shafts across a flat surface. If the ends wiggle up and down, you can try to straighten them, but I'd opt to replace 'em. A bent drive shaft just gets weaker and weaker and will eventually snap. This is bound to occur when you can least afford it, and a broken drive shaft can really damage

the suspension arms and upper links before the car stops moving. Have we found the problem yet? If we haven't, pull the rear tires off the wheels and see whether the rims themselves wiggle back and forth under throttle; bent wheels are rare, but not impossible. Re-install the tires on the rims; first, use contact cement to glue the foam liner to the inside of the tire carcass. The tire beads should fit fully into the wheel grooves, and there shouldn't be high spots (the foam liner sometimes gets caught between the wheel and the tire), and they shouldn't wiggle back and forth, either. Glue the tires to the rims with a brand-name CA, let 'em cure overnight, and your problems should

be over. Don't be tempted to crank the throttle wide open before the CA has dried overnight; you could wind up with CA in your eyes—painful! Also remember that your truck should never run with the tires elevated and the throttle pegged; even perfectly mounted tires will expand and shake a little when you do that. If there's still a little vibration left, pick up one of Trinity's off-road truck tire balancers at the hobby shop, and follow the directions.



Love That Stampede

I have a Traxxas Stampede, and it keeps on rolling over in the turns. I'm a beginner, and my mom has ruled out buying shorter shocks to lower the center of gravity. Would using thicker shock oil work? I'm currently using 25WT fluid and was thinking of going up to 45WT. Any other ideas? I'm getting desperate because my other body has a big hole in it where the body post goes because of its rolling over so much, and I'm a little short on funds because I'm only 10 years old.

THE UNKNOWN RACER
Aurora, CO

I'm the proud owner of a Traxxas Stampede, and I'm having one small problem with it. It uses a modified Speedworks Onyx motor, and I have two pinion gears: an 18-tooth for speed and a 15-tooth for torque. Both of them are matched with an 81-tooth spur gear. When I run the 15-tooth pinion, I hear a loud clicking noise from the transmission area, almost as if a gear is popping out. Could this be because of too much torque?

MIKE TREJO
Chicago, IL

It looks as if Traxxas has produced another winner with the Stampede. As more drivers get their hands on these durable trucks, they'll predictably search for the boundaries of its handling and speed.

Our unknown friend from Colorado is on the right track when he asks about shock-oil weight. Before you buy shorter shocks (which can cause all sorts of interrelated parts, handling and setup problems), try to fix things by using 45 or 50WT oil, and maybe try some stiffer shock springs as well. Four springs and a bottle of shock fluid should cost less than 10 bucks and will significantly reduce diving and weight transfer during cornering. If you read George Gonzalez' "Nitro Stampede" in the July '97 issue, you saw that he installed a set of HPI's five-star wheels. They have a greater offset, which results in wider front and rear tracks. Between the shock oil and the wheels, this should cure any tippiness.

Mike, your problem is a little more confusing. Although I don't think any gears are popping out, it's possible that the 15-tooth pinion you use is chipped, out of round, or worn out. I suggest that you try a spur gear that's as large as the gear cover will permit and adjust the gearing accordingly. Try to use a pinion gear with at least 17 teeth (matched with a 92-tooth spur); an 18-tooth pinion will work if a 98-tooth spur fits. Another possibility is that the pinion's setscrew is rubbing against the spur gear. Ensure that the pinion and spur are properly aligned and that the setscrew cannot come into contact with the spur. ■



If you have a technical problem that your hobby shop or racing friends can't resolve, give us a shout at Radio Control Car Action, and we'll see if we can chase down an answer for you. Questions should be of a technical nature and should be addressed to Troubleshooting, Radio Control Car Action, 100 East Ridge, Ridgefield CT 06877-4606. We regret that, owing to the tremendous number of letters we receive, we can't respond to every one.

PRODUCT WATCH

Need to know what's new? What works well and what doesn't? This section is devoted to objective reviews of all R/C car accessory items. From gears and wrenches to motor brushes and shock springs; if you can use it with your R/C vehicle, you'll find it critiqued on these pages.



52
PC/RC
Watch Dog



55
Dynamite's
Quick Stick
Tire Glue



55
Kose Tools
Pinion Puller
and Solder
Helper



58
Team CRC
Power F1
Conversion
Kit



62
Speed Check
Personal
Sports Radar

PC/RC Watch Dog

SECURITY SYSTEM FOR YOUR R/C CAR

HAS THIS EVER happened to you? You're at the track putting in some practice laps when your car suddenly goes wild and runs into a track barrier, and the chassis snaps in two or a vital suspension component breaks. Hey, this has happened to me many times. Sometimes, it's caused by faulty equipment; other times, it's caused by inconsiderate racers who turn on their radios without first checking to see if someone else is on the same frequency. Fortunately, this has never happened to me; I've never encountered conflicting signals when I was practicing with one of my glow-powered vehicles, or things would have gotten downright ugly.

Of course a fail-safe system—like the ones on the more expensive, PCM-type transmitters—would prevent your car from going out of control when a conflicting RF signal is received or if the signal is lost altogether; PCM transmitters, however, are expensive.

PC/RC TO THE RESCUE

Well, the folks at PC/RC* have come up with an affordable way to protect your R/C investment from being damaged because of conflicting or completely lost RF signals. Enter the Watch Dog. Just as the name implies, the Watch Dog is basically a security system for your R/C car. Just install it between your receiver and servos and let it go to work. If a conflicting signal is observed or if the signal is completely lost, the Watch Dog will automatically return the servo(s) to neutral.

ELECTRIC OR NITRO: IT'S ALL THE SAME

Many electronic speed controls (ESCs) available today have safety features that will prevent an R/C car from losing control if its RF signal is lost altogether. But if someone happens to be on your frequency, the best ESC in the world won't save your bacon; your R/C vehicle could end up in the woods, or even worse, on the highway! The Watch Dog will effectively protect your ESC-equipped R/C vehicle from conflicting RF signals.

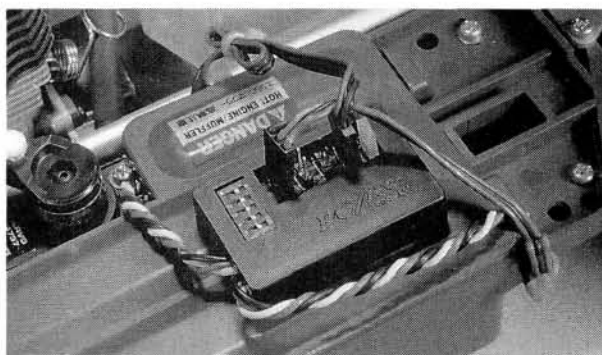
How about electric R/C vehicles that use servo-driven mechanical speed controls? Just like on a glow-powered vehicle, a second servo is used to operate the

throttle. The Watch Dog is most effective when it has control of both servos. Of course, installing a Watch Dog will protect your electric powered R/C vehicle from conflicting or lost signals, but many may argue that today's R/C cars have very little room on the chassis.

If you own a glow-powered vehicle, consider the Watch Dog an excellent investment. Many things can happen when you run your fuel-powered car or truck; the crystal can become damaged or ejected from the receiver, fuel can spill into the receiver, etc. Heck, I've even managed to break a servo horn right off the throttle servo. Any of these problems can result in a runaway, not to mention those lost or conflicting RF signals I've mentioned.

HOOK IT UP AND FORGET IT

The Watch Dog takes only a few minutes to install. Simply connect your steering and throttle servos and the receiver-battery-pack switch to the Watch Dog, then connect the Watch Dog to your receiver, and you're done. The moment you turn on your receiver, the Watch Dog goes through a quick calibration mode; then a green or red LED (depending on which radio



system you have) glows to signify that the unit is operating.

The Watch Dog has two auxiliary power jacks that are useful for connecting other devices such as a temperature gauge or a tachometer—a very nice feature. The unit is also small and light, so it shouldn't be very difficult to find a place for it on your chassis, even though some racers argue that today's R/C cars have very little spare room there. Overall, I'm impressed with the Watch Dog; it has been protecting my 1/8-scale Tamiya TGX for several months now.

—George M. Gonzalez

DYNAMITE'S QuickStick Tire Glue

TRACTION REPAIR IN MERE SECONDS

Because of the current trend toward using softer, higher-grip R/C car tires, proper tire mounting has become an issue. Are your vehicle's four traction-getters that are perfectly attached at the start of a heat race coming back 4 minutes later with big ole gaps between the tires and rims? If so, don't fret. Dynamite's* new QuickStick tire CA will attach both on- and off-road tires firmly to their rims! Sold in several thicknesses, these adhesives work great on both rubber and foam tires.

For my testing purposes, I picked the thin CA. I prefer thin CA for this type of work for two reasons. First, it dries quickly, and second, you're less likely to end up with unwanted high spots once the glue has cured.

I chose tires from my "to be repaired" tire box to experiment with the CA. I laid out Bolink*, Losi* and Tamiya* rims shod with both foam (Bolink) and natural rubber (Pro-Line/DuraTrax*) and glued them up wherever I noted a gap or loose spot between the tire and rim.

I repaired the Bolink on-road foam tire/nylon rim first. The fine, tapered applicator tip on the QuickStick bottle made it dirt-simple to touch up the foam/rim edge. Total cure time was less than 1 minute, and the tire and rim were ready to go out on the track.

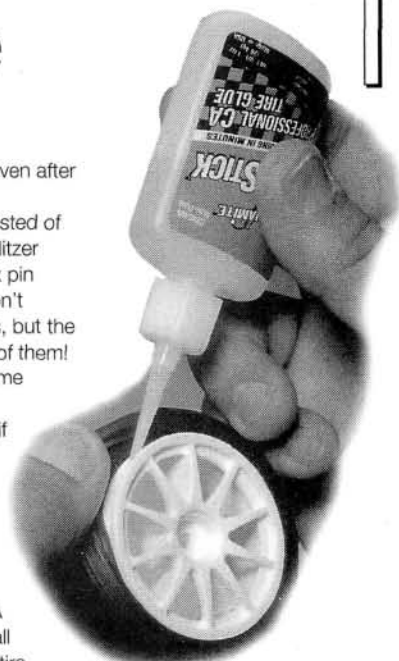
It took me just over 60 seconds to set up the Losi off-road rim with the Pro-Line fuzzy rear tire without using a CA kicker/accelerator. The seal between the rim and tire was excellent and didn't

show any sign of loosening even after several runs.

The last test sample consisted of a 2.2-inch Tamiya Stadium Blitz rear truck rim and a DuraTrax pin spike tire. Some CA glues don't adhere well to Tamiya wheels, but the QuickStick thin CA isn't one of them! Cure time was almost the same as with the Losi/Pro-Line setup: 1 minute, tops. Note: if you have "chrome-plated" rims on your Tamiya vehicle, you'll need to sand off any plating around the rim's tire-mounting slots before you glue the rubber in place.

Overall, the QuickStick CA got an A-plus test grade on all three rim/tire selections. The tire glue stuck well, set up fast and adhered firmly no matter how much stress I subjected each sample to. I highly recommend this tire adhesive for R/C'ers' toolboxes with one warning: if you have the only bottle at the track, be prepared to be very popular!

—Rick Eyrich



PHOTOS BY WALTER SIDAS

KOSE Pinion Puller & Mini Vise

TWO TOOLS TO MAKE YOUR R/C LIFE EASIER

I'm always on the lookout for cool new tools that will make it easier to work on R/C stuff. Now, when I already have large calluses on my fingers (too much holding hot wires while soldering battery and motor connectors), along comes a little device that actually does all the holding for me. The Kose* Solder Helper is the perfect size for holding

Deans*, AstroFlight* and Sermos* connectors. Hold the connector in the vise, and you'll have two free hands—

one for holding the soldering iron and one for holding the wires with pliers—cool!

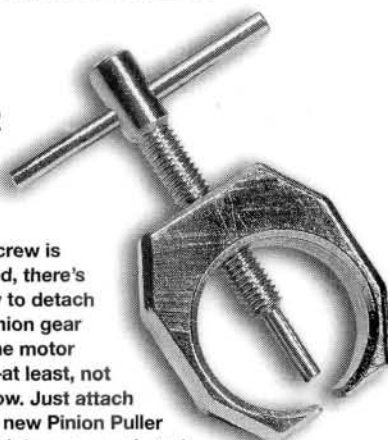
The unit is machined of solid brass so it won't fall over while you're soldering, and a thumbscrew allows you to open and close it quickly. This high-quality tool may also be used for other applications: use it to hold small parts for soldering, gluing, or painting. The Kose Solder Helper will be a welcome addition to your toolbox (part no. K-9038).

WHY PUSH WHEN YOU CAN PULL?

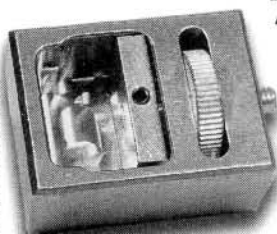
Have you ever stripped the small grub screw that secures the pinion gear to the motor shaft? Come on; we've all done this at least once. And when the

grub screw is stripped, there's no way to detach that pinion gear from the motor shaft—at least, not until now. Just attach Kose's new Pinion Puller to the pinion gear and start cranking on the T-handle. Within seconds, you'll have the pinion gear in your hand, and the motor will be ready to accept other gears. So don't throw that motor away; pick up a Kose Pinion Puller (part no. K-9008).

—George M. Gonzalez



PHOTOS BY JOHN HOWELL



TEAM CRC *Power F1* Conversion Kit

RUN YOUR CELLS INLINE FOR
BETTER PERFORMANCE

IF YOU RACE in the Formula 1 class, either on carpet or on a parking lot, chances are that you own a Tamiya* F103 or an HPI* Super F1 chassis. These two account for the majority of F1 cars found on the circuit today, and for good reason: they're durable, tunable, relatively inexpensive and very competent racing tools. Both share the same shortcoming, however: the battery pack is placed across the chassis. Although this design feature improves rear traction, it compromises steering response because a large percentage of the car's weight is out on the sides. Dedicated pan-car racers have known for years that a car will handle better if the batteries are kept as close as possible to the chassis' centerline. Team CRC* owner Frank Calandra is a world-class driver who knows all about pan-car design. His Carpet Knife and Roadkill kits are well-respected by serious carpet racers; this new conversion kit for the Tamiya and HPI Formula 1 cars brings that design skill to a whole new market.

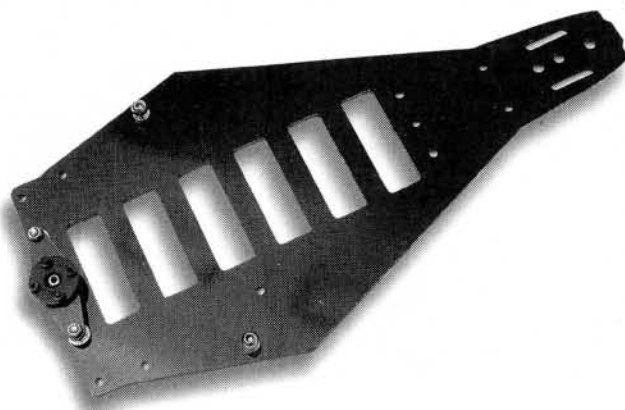
The basic kit consists of: a main chassis plate that reorients the batteries down the center of the car; a floating rear-pod assembly that, like the Carpet Knife 1/12-scale chassis, eliminates the T-bar; and various bits and pieces that allow the owner to complete the conversion. It's easier to make the conversion if you already own a Tamiya or HPI car, because purchasing the necessary items to complete the Power F1 car can be costly.

The conversion is fairly straightforward and takes only an evening or two. You must file the edges of the battery slots to allow side-by-side packs to fit as low in the chassis as they can go (stick packs will fit, but most serious racers will choose

matched cells in a side-by-side configuration) and seal the slots' edges with CA to prevent chipping and delamination. The rear pod is attached with a pair of turnbuckle links and captured balls and is damped by an oil-filled tube connected to a simple tweak brace; pod roll is controlled by small, progressive-rate springs on each end of the brace. Although you have to perform major surgery on the Tamiya servo mount to make it fit properly (it's the attachment point for

the battery brace), the instructions include detailed drawings that make things pretty clear. The HPI version of the kit uses the original shock absorber, and the Tamiya one includes a Delta-type shock for the upper pod plate.

My Power F1 was a Tamiya conversion that had been



Although it takes a steady hand to guide the finished product around the track, there's no question that it's faster and more efficient through the turns than the original car.

upgraded with a purple-anodized aluminum rear pod with adjustable-ride-height bearing inserts. I combined this with a 103 front-end assembly (either the original or articulated front-end parts will fit, as will HPI's excellent and very adjustable suspension), Lunsford* titanium turnbuckles and Robinson* zero-tolerance ball ends, a six-pack of Ballistic Batteries** matched, enhanced-voltage Sanyo* 2000 cells, a Futaba* 132H steering servo, Novak* NER-3FM receiver and Hammer Pro ESC.

As promised by CRC, this combination proved to have a great deal more steering than the original 103 setup. Transition through a series of tight turns is greatly improved, with less chassis sway and generally tighter response to every steering input. Although it takes a steady hand to guide the finished product around the track, there's no question that it's faster and more efficient through the turns than the original car. Experience with a few of these kits by fellow F1 Club of Washington members has shown that it takes a little time to get the rear end dialed in, but I'd say that the effort is well worth it. I'd also warn potential buyers that this is not a kit for the new racer, as some of the pod pieces are somewhat brittle and prone to breaking when subjected to high-speed sideways wall slappers.

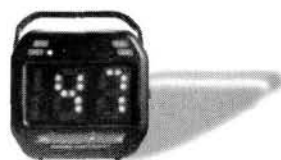
If, on the other hand, you're a seasoned F1 veteran, and your track, club, or local race-series rules permit aftermarket modifications as extensive as these, I strongly suggest that you look into the purchase of a Power F1 conversion kit. The high-quality parts, comprehensive instructions, fully adjustable suspension, and proven competition design make this an excellent choice for the serious racer who's looking to maximize the F1 performance envelope.

—Doug Mertes



SPEED CHEK Personal Sports Radar

HOW FAST DOES YOUR R/C CAR REALLY GO?



HONESTLY BELIEVE that we R/C racers have one thing in common: we want our R/C cars and trucks to go as fast as possible. But just how fast can we make them go? And how can we accurately measure their speed without investing in a \$2,000 radar gun or messing around with tape measures and stopwatches? Well, guess what?; there is an affordable, easy way to measure your R/C car's speed without your having to refinance your house or set up a speed trap.

PERSONAL SPORTS RADAR?

Enter the Speed Chek Personal Sports Radar. Available through America's Hobby Center*, the Speed Chek is manufactured by Tribar, the company that makes the radar units used by police and professional sports organizations all over the world. With that in mind, it's safe to say that the Speed Chek is a high-quality product.

HOW IT WORKS

As mentioned earlier, the Speed Chek uses a process called Doppler signal processing to record speeds. An internal antenna sends out a specific radio frequency signal (110.525GHz). The frequency projects a flashlight-type beam, and when a moving object such as an R/C car passes through the device's transmitted signal, the frequency of the signal (reflected off the R/C car) changes or "shifts." This frequency change, or "Doppler shift," is proportional to the R/C car's speed, and the Speed Chek's internal circuitry instantly processes the return signal and displays the speed in mph or kmph.

TESTING TIME

There are several ways to use the Speed Chek to measure your R/C car's speed, but I found this one to be the easiest and most accurate: set the unit on the ground (track surface) with the LED display facing forward. Next, stand directly behind it and hold your radio transmitter in your hand. Drive the car toward you at full speed, and when the car gets within 9 feet of the Speed Chek, veer it right

or left. (Be careful; you don't want to run into the Speed Chek, although we did punt it a few times, and it still worked great.) You can also raise the Speed Chek so you don't have to swerve away from it to avoid hitting it.

After one pass, take a look at the unit's LED display. The speed will be displayed for 3 seconds, but you can recall the last recorded speed anytime afterward by pressing the recall button. In addition, the speed is recorded whenever you make a pass, so you don't have to reset the unit every time.

GEAR IT UP TO FLY

The Speed Chek could be used as a tuning tool. If you're doing some high-speed running around your neighborhood, make a pass through the Speed Chek and record your speed. From that point, just gear up one tooth at a time until your car reaches its maximum speed. The moment your car records a slower speed, you'll know you've gone too far, and you need to gear down a tooth; it's that simple.

The Speed Chek could also be useful at the track. Set it up at the end of the longest straightaway, and gear your car up or down until you reach your highest speed. Make sure, though, that your car still has room to slow down for corners so it doesn't end up in someone's pit area.

The Speed Chek sells for around \$159, which might seem a bit expensive. When you consider, however, that a professional sports radar unit sells for about \$2,000, the Speed Chek's street price starts to look very attractive. If you're a speed freak (like me), you just have to know how fast your cars can go.

HOW FAST IS FAST?

OK; how fast did we get our cars to go? Well, my Tamiya TA03 F-Pro with a 12-turn Reedy DS motor and 6, 2000mAh cells reached 32mph. My Tech Racing Voggerd T-10, equipped with a Trinity Dirtinator 11-turn motor and 6, 2000mAh cells, topped off at 38mph. My Associated Dual Sport with a Peak Performance 12-turn motor, 6, 2000mAh cells and an HPI 2-speed tranny reached 39mph. I was a little bummed that none of my cars was able to break the 40mph barrier. Oh well; looks as if I'll be ordering those 10-turn motors after all

—George M. Gonzalez



HERE'S A SHORT LIST OF THE UNIT'S FEATURES:

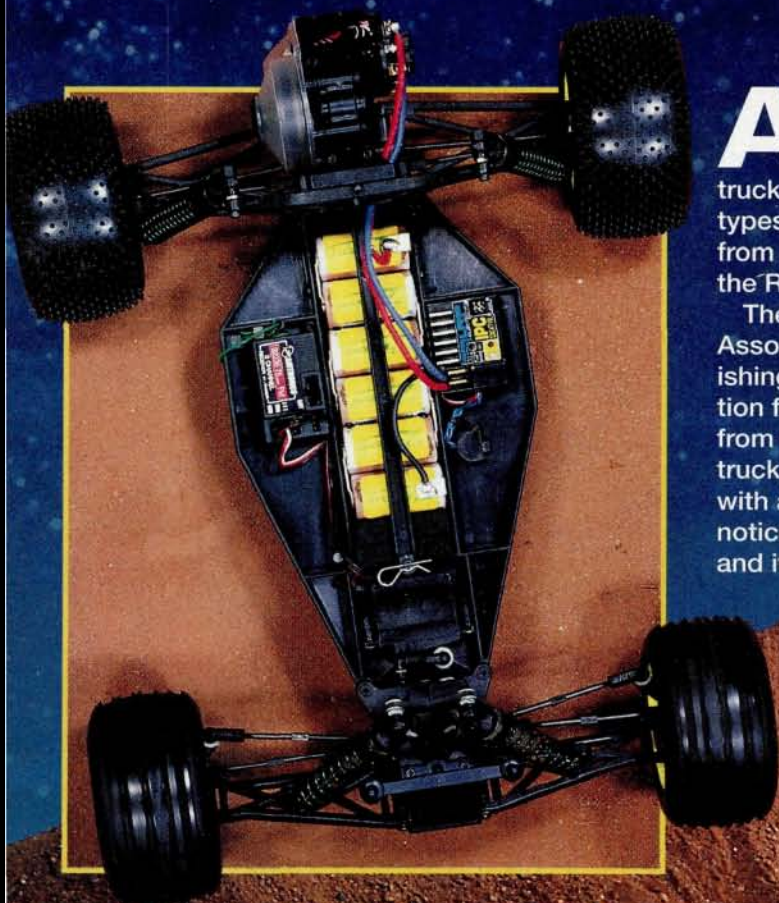
- It uses the same Doppler signal processing principle as does a professional sports radar unit.
- It's durable, light and compact.
- It has a large, three-digit highly visible LED display.
- It switches from miles per hour (mph) to kilometers per hour (kmph) with the press of a single button.
- It measures a wide range of speeds (6 to 150 mph or 10 to 199 kmph).
- It operates on AC or DC, or on six AA batteries. (An AC adapter is sold separately.)
- To conserve battery power, the unit has a disable feature that turns it off automatically.

*Addresses are listed alphabetically in the Index of Manufacturers on page 200. ■

INSIDE THE **Team Associated**

by Frank Masi

T3



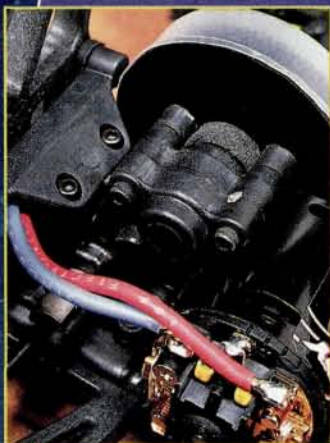
AS PROMISED in last month's "Inside Scoop" column, here's a more detailed look at Team Associated's* brand-new T3 racing truck. As this is being written, only six T3 prototypes exist; we were able to pry one of them away from Associated. The rest were headed to Texas for the ROAR Off-Road Nats.

The T3 was conceived back in '95 when Associated's R&D department was putting the finishing design touches on the B2 buggy in preparation for its world championship debut. Because from the start the intention was to create a "B2 truck," many of the B2 buggy's parts were designed with a dual purpose in mind. As a result, you'll notice a striking similarity between the new truck and its buggy counterpart.

**World champion
technology rolls on
big wheels**



The T3's chassis is identical to that of the B2 buggy, with a single exception: the truck's chassis is slightly longer. Its extended wheelbase accommodates larger wheels and tires and provides increased stability. The additional length also allows more flexibility with battery placement; you may be aware that this year, ROAR has placed a 6-cell limit on all off-road classes (including trucks), so battery placement will play an even larger role in weight distribution. There will be many more positions available for the pack.



PHOTOS BY WALTER SIDAS

The T3's Stealth transmission is the same as that of the B2. Cliff Lett, chief designer of the T3, recalls that when the B2 was released, many people wanted to know why Associated had chosen a 2.4:1 ratio; what did he, Cliff, know that they didn't? Was there a hidden advantage? Now that news of the T3 has been made public, Cliff admits that the design of the B2/T3 tranny dates back to '95, when Associated determined that a 2.4:1 output ratio was a good compromise between the requirements of both buggy and truck—no mystical secrets; just sound manufacturing logic. If you race both a B2 and a T3 and their parts are interchangeable, you'll have fewer of them in your pit box, and dealers will need to stock fewer of them as well.

The T3 is the first kit to include Associated's new slipper clutch, which offers better performance with fewer parts. This new design transfers more torque to the wheels, yet because its slipper pad has a 15 percent larger diameter, the slipper spring can be set more loosely for more consistent performance and longer pad life. This new slipper will also find its way onto all Associated off-road kits as a running upgrade.



Inside the Team Associated **T3**

The T3 has all-new suspension and steering geometry.

New caster blocks use a combination kingpin/camber link to eliminate one suspension joint, which results in less slop. This also provides a camber-link position that's further outboard, which improves the steering by allowing a better mounting point for the inside camber link.

Steering is further enhanced through new, more rigid steering arms that provide enough movement for a full 45 degrees of inside wheel travel. The steering arms are also longer, which allows the steering bellcranks to use their full throw for an improved ratio of movement between the steering arms and the steering servo. This, combined with new, beefier, molded ball cups makes for almost slop-free steering and suspension systems.



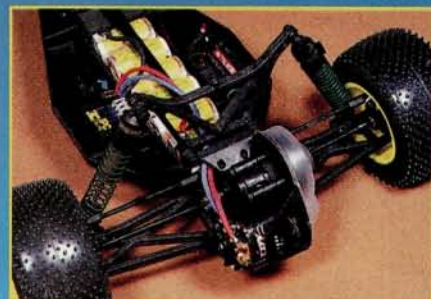
To increase the shock's compression travel, i.e., to allow the shock shaft to completely enter the shock body without hitting the shock cap, new rear shock bodies have been length-

ened from 1.32 inches to 1.39 inches. The new rear shocks are attached to a molded-composite shock tower that also incorporates the rear body mounts. Look for optional graphite-composite replacement parts from Associated for most of the T3's molded chassis and suspension bits, just as you would for the B2 buggy.

The T3's wheelbase is just slightly longer than that of the T2. Associated gave in to customers' demands and designed new rear hub carriers that offer additional holes for the rear, upper camber link. This provides serious racers with more tuning aids, i.e., more "stuff" with which to fine-tune their truck's handling. The new hub carriers also allowed designers to fit the T3 with longer rear suspension arms than those of the T2 to improve handling on rough tracks.

Production T3 kits will come standard with 3 degrees of rear toe-in and 3 degrees of anti-squat (the angle at which the rear suspension arm pivots in relation to the chassis), both provided by the rear suspension arm mount. During testing, most team drivers found that placing a washer beneath the rear of the arm mount—thereby reducing anti-squat to 1½ degrees—resulted in better performances on the track. For this reason, Associated will include a set of washers in the kit.

Additionally, optional rear arm mounts will be offered in "2-3," or 2 degrees of toe-in, 3 degrees of anti-squat; and "3-0," 3 degrees of toe-in and zero anti-squat. There's also a new motor plate that provides better protection against scrapes and debris for the endbell portion of the motor.



The Little Things Count

When a new kit hits the scene, the design and mechanical pieces usually receive the most attention. But what about the more subtle improvements—like the instruction manual—that often go unnoticed or unappreciated? If you've built an Associated car or truck lately, you've noticed that the instruction manuals have been improved substantially. Through extensive use of computer-generated illustrations and careful wording, Associated has increased the "comprehension" factor while cutting down on the text. As a result, the building process has become more enjoyable.

They've gone a step further with the T3 by adding more "parts coding," i.e., the little "L" and "R" markings that help you figure out the proper orientation for non-symmetrical parts. Look for even more of these kinds of improvements in future Associated kits.

With the release of the T3, Associated has streamlined its off-road lineup and now packs quite a technological one/two punch. We've been informed that the T3 will also be available in a budget-price version that will replace the company's T2 Sport truck kit. Racers and hobby dealers should love the fact that the new truck shares so many parts with the B2, and if you're an Associated loyalist, it's going to be awesome having a B2 and a T3 proudly displayed on your pit table. ■

thrash
TEST

1/10 scale gas

TRAXXAS

Nitro Rustler

by Greg Vogel

Many of us were deeply saddened to hear that the Traxxas* Nitro Hawk was being discontinued. What was Traxxas' objective? To torture and taunt us?—especially after they released a special edition Nitro Hawk with bearings and a .15-size engine.



Well, there was a method to their madness. They were just preparing us for the introduction of the awesome new Nitro Rustler. Traxxas has addressed the needs of enthusiasts who just want to have a blast and those who want to get down to thrashing their truck in friendly competition.

Now, I'll be the first to agree that Traxxas vehicles were designed to attract newcomers to the hobby without breaking the bank. The Nitro Rustler follows that traditional thinking and was designed to be an inexpensive, durable, "race-able," nitro-powered stadium truck.

Some may think that a truck that was made for general fooling around should not be allowed to race in competition, but after you've checked out its features, you'll agree that this gasser is suitable for both backyard bashing and racetrack thrashing.

A LEGEND IN THE MAKING



specifications

SCALE 1/10

LIST PRICE \$475

SUSPENSION (F/R)

Type Lower A-arm, upper adjustable turnbuckles
Damping Molded, oil-filled, coil-over shocks

DIMENSIONS

Length (overall) 17.25 in.
Wheelbase 11.31 in.
Width (F/R) 12.5/12.36 in.

WEIGHT (gross, RTR) 4 lb., 1 oz.

CHASSIS

Type Double-deck
Material ..Composite upper, stamped aluminum lower

DRIVE TRAIN

Type Gear
Primary Clutch bell/spur
Transmission Three-gear
Differential(s) Planetary gear
Slipper clutch Friction w/Rulon pegs
Bearings/bushings Bearings/Ollite bushings

WHEELS (F/R)

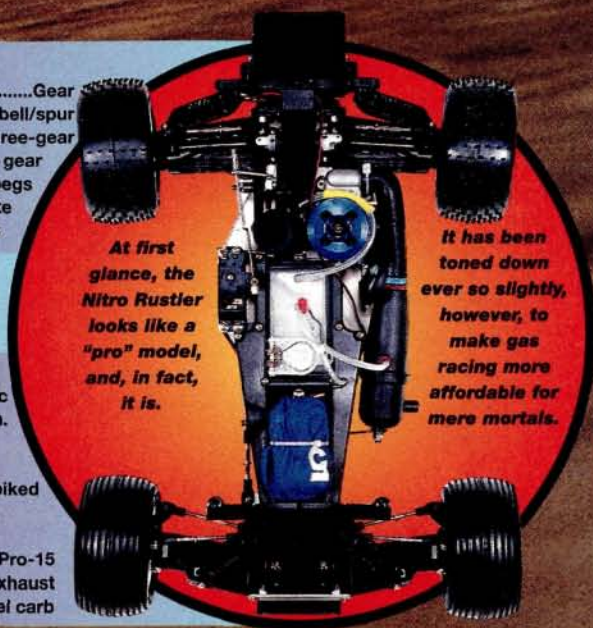
Type One-piece plastic
Dimensions (DxW) ...2.2x2 in.

TIRES (F/R)

Type Rubber ribbed/spiked

POWERPLANT

Engine TRX Pro-15
Pipe Composite tuned exhaust
Carb Rotary-barrel carb



At first glance, the Nitro Rustler looks like a "pro" model, and, in fact, it is.

It has been toned down ever so slightly, however, to make gas racing more affordable for mere mortals.

PHOTOS BY JOHN HOWELL AND WALTER SIDAS



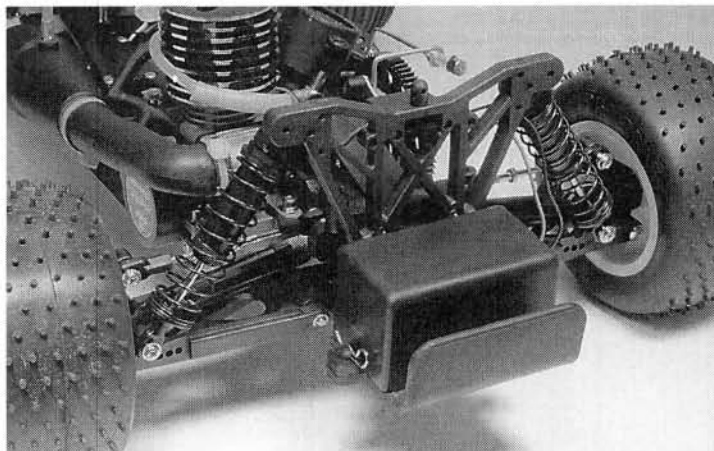
Adjustable turnbuckles, extra-long suspension arms, big-bore shocks, fiberglass hinge-pin brace; hey, isn't this an entry-level truck?!

WHAT'S IN THE BOX!

Normally, we start these reviews by describing what's in the kit, but the Nitro Rustler comes built. This is a definite advantage for those who don't enjoy building or just want to have fun in a hurry. The Nitro Rustler comes in two versions: one with a radio and one without.

Now let's check out the truck's features! At a glance, it appears that the Nitro Rustler is an all-new truck, and in some areas, it is. But those who are familiar with Traxxas vehicles may see some striking resemblances to Traxxas' top-of-the-line racetruck, the SRT. Starting at the front, the wide front suspension arms keep the truck stable. All racetrucks incorporate wide arms for better handling. The front bulkhead, not the chassis, contains the kick-up, and a fiberglass brace between the arm pins adds strength. A composite shock tower helps to support the large-volume shocks. These long front and extra-long rear composite oil-filled shocks make the truck handle very well,

What's going on back here? More adjustable turnbuckles, big-bore shocks and extra-long suspension arms. Check out the universal sliders and cool battery box. This is one sweet truck!



Building & Setup Tips

Most newcomers to the hobby prefer to buy an assembled R/C vehicle instead of a kit (I should know; I work in a hobby store). I honestly believe that this is not because they're intimidated by the idea of building; it's because they want to experience the thrill of R/C as soon as humanly possible. Hey, it's the '90s. Who has time to build? But you shouldn't assume that the car has been built to be indestructible. Always take a couple of minutes to inspect it for loose screws and parts; just think of this as your first maintenance check-up.

- Use liquid thread-lock on all the screws that make contact with metal. This precaution will save you a lot of grief. The engine is the most crucial part of the vehicle, so consider applying Loctite® to the engine-mount screws and exhaust-manifold screws a must.
- A fuel filter is another nifty item that can save you grief and cash in the long run. A fuel filter will catch the unwanted dirt, sand, grass and trail mix that always seem to find a way into your tank and cause the engine to bind or run improperly.
- Proper cooling is also extremely important. Cut an opening in the front windshield and driver's side window to allow air to circulate around the cylinder head. The opening on the driver's side window also allows access to the pull-starter cord. I made a hole in the body directly over the engine so that I could insert a glow-plug igniter. Now I can start the truck without removing the body.
- Do not run the truck too lean. Sure, the engine will perform better, but it will also run much hotter. I always recommend running the engine as rich as you can without it flooding or flaming out. This will ensure a long engine life.
- The truck was set up very well out of the box, and I recommend that you stick with the stock setup until your skills improve. To improve performance and reliability, replace all the bushings with bearings. Then, if you want to get a little more serious, think about getting the ball differential and aluminum shocks. I bet that with these few hop-ups, you can have your entry-level gas truck handling like the pros.

THINGS YOU'LL NEED

The Nitro Rustler comes 100-percent assembled. You can choose from two versions—with radio and without. If you opt for the truck without radio, any 2-channel radio system will work well. Here are the rest of the items you will need:

- Paint for the body.
- Glow-plug igniter.
- Fuel.
- Batteries for radio and receiver (12 AA batteries).
- Tools for maintenance.

FACTORY OPTIONS

- Three-stage air filter—part no. 4063.
- Engine backplate—4012.
- Ball-bearing set for Nitro Rustler wheels—4607.
- Big-bore aluminum shocks (front and rear)—2660 and 2662.
- Pro ball differential—4420.
- 66-, 70- and 72-tooth spur gears—3166, 4470 and 4472.
- 16-, 18-, 20- and 22-tooth clutch bells—4116, 4118, 4120 and 4122.
- Fiberglass set (includes shock towers and chassis top plate)—4442*.
- Graphite set (includes shock towers and chassis top plate)—4442X*.

*Pieces available separately



NITRO RUSTLER

Rulon pegs for the slipper clutch, and behind that is the new disk brake. This is a welcome addition; the old lever-style brake on the Nitro Hawk just wasn't happenin'. Another nice new feature is the redesigned 75cc fuel tank. It has a low-profile design and is slanted toward the back of the chassis. A new primer makes starting much easier. The T-6 aluminum chassis gains extra support from the composite upper deck, as does the steering bellcrank system. A brace also runs from the upper deck to the lower chassis and

TEST GEAR

The kit comes with Traxxas' new TQ radio. The grip is extremely comfortable, and the weight distribution is just right. Standard servos and receiver round out the included radio gear. I used Dynamite* 10-percent fuel and a Du-Bro* glow-starter to power up the ponies. Motion Graphics* gets the credit for the awesome paint job.

PERFORMANCE

Traxxas includes excellent tuning instructions and extra head shims to allow you

So after I had bought new tires, I set out for R/C Madness in Enfield, CT, to see whether the Nitro Rustler has what it takes to keep up with the big boys. Track owner Chris Marcy had apparently overdosed on sugar-filled mint candies and had gone insane: he had created a totally awesome "Mega Supercross Track." Let's just say the track had it all.

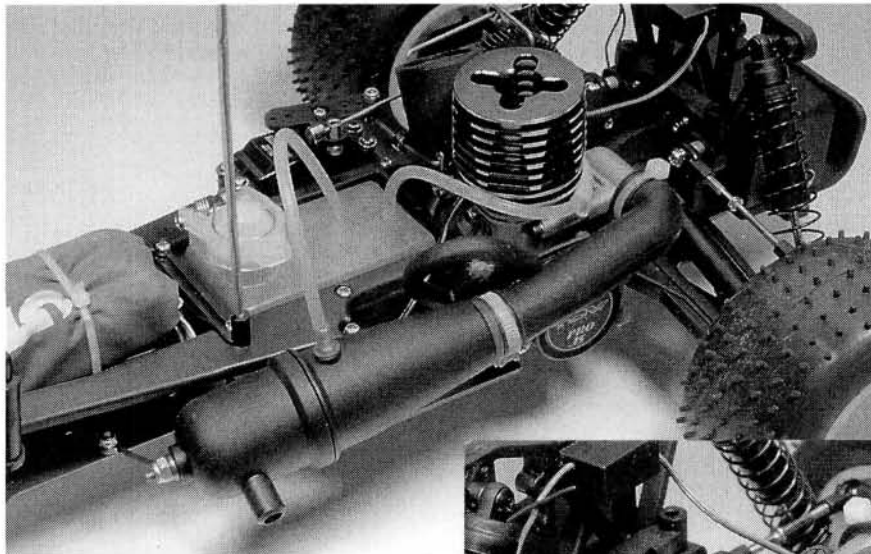
The Team Losi* silver ribbed tires in the front and silver step-pins in the rear cured the push and hooked the truck up. What really amazes me, though, is that my

Likes

- Fast TRX Pro-15 engine.
- Ready to run—cuts down tinker time and increases play time.
- The included composite tuned exhaust provides a lot more power.
- Bulletproof transmission with ball bearings and slipper clutch.
- Handles like a racetruck.
- Racing potential.

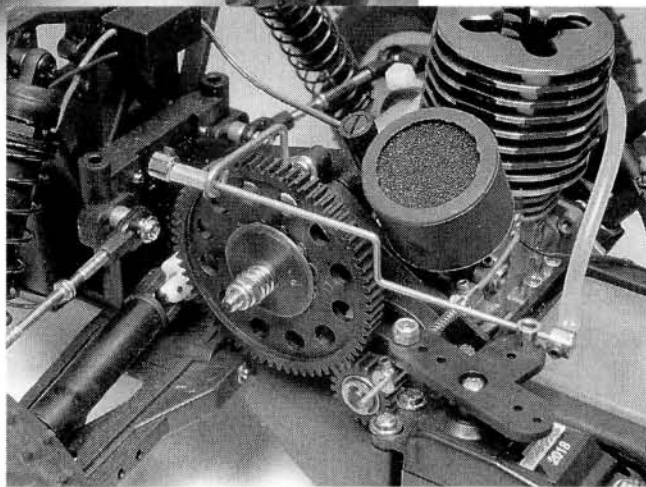
Dislikes

- Front tires do not have very good grip.



Above: the heart of the Nitro Rustler is the Traxxas TRX-Pro 15 with large heat-sink head, big-bore carb and handy pull-starter. Love that 75cc fuel tank with priming bulb. Yup, that tuned pipe is standard, and it really gives the engine an extra kick.

Right: the linkage is straightforward and easy to adjust. Traxxas provides spur gears in two sizes for precise track tuning, and the engine's adjustable mounts allow easy clutch-bell changes. Check out the camber-link mount; roll center can also be adjusted on this so-called "entry-level" truck.



then to the transmission to provide the ultimate in rigidity.

Now let's talk about the powerplant. If you haven't heard by now, Traxxas is throwing their TRX Pro-15 into all of their kits. The trick blue-anodized head comes stock on the Nitro Rustler and features parts like a recoil starter, thumb-adjust high-speed needle valve, barrel carb and sealed output bearing. The clutch bell is steel and also rides on sealed bearings. Unlike other Traxxas kits, this truck comes stock with a composite tuned pipe. The pipe, in combination with the rubber coupler and manifold, uses the exhaust to create more power—as if the .15 engine weren't enough!

to adjust engine compression during the break-in process. The extra head shim makes the engine much easier to start, and once the engine has been broken in, you can remove it to achieve maximum performance. You can also use it to compensate for elevation changes that can affect the engine's performance. After I had broken the engine in, I packed my equipment and took the truck to a new track that had opened down the road from my house. This truck handled excellently, and I was very impressed. The truck took a slight nose-up attitude when it hit the jumps and landed sturdily. I did notice that it pushed tremendously, though; I figured the stock front multi-rib tires were the culprits.

Nitro Rustler was one of the most dialed trucks there that day. It kept up with RC10Ts and Losi GTXs. The Nitro Rustler was just as fast as, if not faster than, any of the others on the track. Now, that's some testament to its capabilities!

FINAL THOUGHTS

Traxxas has produced another outstanding nitro-

powered stadium truck that fills the needs of anyone who wants to get started in this ever growing hobby. From durability to race potential, this truck has it all, and all you need to worry about is which colors you should use to paint the body. Check out this truck the next time one passes you. Better yet, just look at the pictures in this article; we were able to freeze the blur!

**Addresses are listed alphabetically in the Index of Manufacturers on page 200.*

MRC **Vortex** by Peter Vieira



A feature-filled buggy for

H EY KID, ya gonna buy the magazine or what? Look at these cool action shots—this hobby rules, you should be a part of it! What? You could never build one of these things? Too expensive? Probably not fast anyway? Wrong on all counts, bud. As a matter of fact, this could be just the car to get you started in R/C: the MRC* Vortex. It has all the goods to turn that vacant lot at the end of your street into a dirt nirvana for off-road fun. So put down that wrestling magazine, buy this one and read on.

KIT FEATURES

Big feature number one: the Vortex comes built. I received a pre-built buggy complete with a Futaba* Magnum Sport AM radio. If you want to know your

Vortex inside and out, you can save some bucks by building one yourself with the kit version. This pre-built stuff is pretty cool, though; open the box, and there it is—shocks filled with oil, tires mounted, radio installed. OK, you'll have to paint and trim the body, but I think that's a plus. Do you really want to have the same factory paint job as every other Vortex owner out there? Do your own thing! If you want that Tasmanian Devil-with-splatter-and-checkerboard look, go for it. Here's what that body will be covering

CHASSIS

Any manufacturer that skimps here might as well write off the whole car. MRC did it right; they built the Vortex around a tough, injection-molded platform with thick



the "first-timer"

stiffening ribs and a rugged, molded-in battery box. A heavily reinforced plastic brace extends from the battery box to the front bulkhead to support the front of the car. In the rear, a metal stiffening plate is bolted beneath the transmission to help support the rear arm mounts. A flexible front bumper is a welcome addition on any entry-level car, but MRC goes a step further and adds one to the rear, as well. That "ounce of prevention" could spare you a damaged motor or a bent motor plate.

MRC seems to have gotten the reinforcing-fiber content of the plastic parts right; the individual components have some stress-relieving flex, but the completed chassis has a good, solid feel.

specifications

SCALE 1/10
LIST PRICE NA

DIMENSIONS

Length overall 16.75 in.
Wheelbase 11 in.
Width (F/R) 9.75/10.6 in.

WEIGHT (gross, RTR) 3 lb., 7.5 oz.

CHASSIS

Type Molded semi-tub
Material Fiber-reinforced plastic

DRIVE TRAIN

Type Sealed gear
Primary Pinion/spur
Transmission Dogbone/axle
Differential(s) Ball type
Slipper clutch None
Bearings/bushings Plastic bushings

SUSPENSION (F/R)

Type Lower suspension arm w/molded upper link
Damping Oil-filled, coil-over shocks

WHEELS (F/R)

Type One-piece plastic
Dimensions (DxW) 2.2x7.5 in./2.2x1.5 in.

TIRES (F/R) 4-rib/5-row mini-pin

ELECTRICS

Motor 20-turn fixed endbell
Battery Not included
ESC 3-step mechanical

PHOTOS BY JOHN HOWELL AND WALTER SIDAS



MRC VORTEX

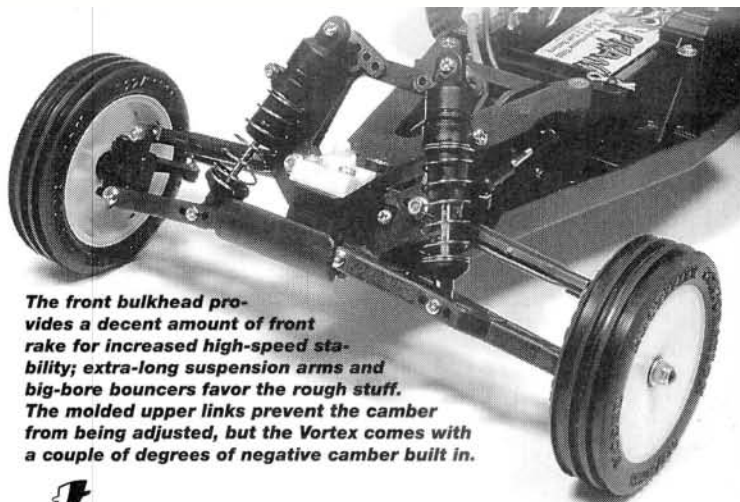
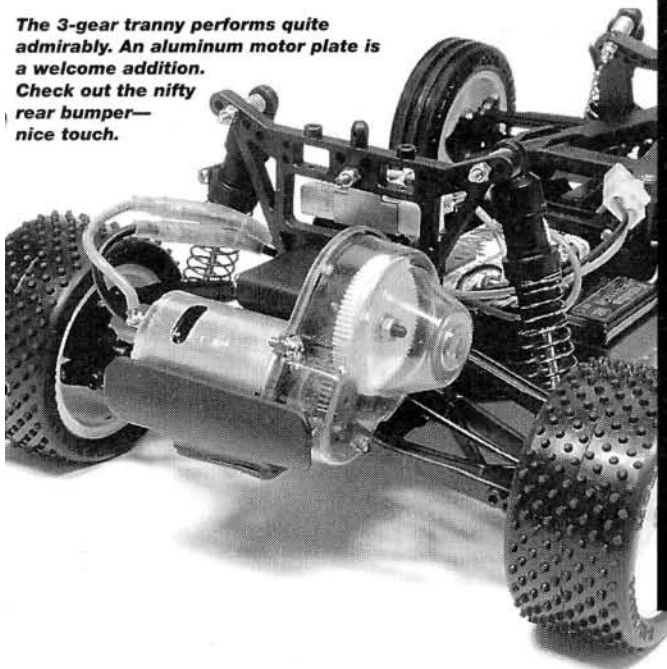
SUSPENSION

Judging by the Vortex's long-legged, high-ridin' stance, MRC has skewed this car toward "big air" fans. No complaints here! When I first got started in this hobby, the prospect of launching monster jumps was a key attraction (still is); I bet a lot of R/C'ers like the crazy sky shots. When hang time is over, though, the Vortex should have no trouble reconnecting with terra firma, thanks to well-braced A-arms that are supported by long, oil-filled dampers at all corners. In addition to softening the blows of big-G landings, the Vortex's ample ground clearance and long-travel suspension should also help it fare well in the obstacle-ridden terrain sport cars typically run on. At 3.25 inches (extended), the front shocks are longer than most buggy bouncers and should provide some extra cushioning over the rough stuff. Plastic shock bodies keep costs down, and screw-on seal caps will make rebuilds a breeze when the time comes. Flexible (but not too flexible) plastic shock towers should be able to shrug off rollovers without a whimper, and they feature a wide array of shock-mounting options for tuning experiments down the road. The Vortex has non-adjustable upper links in the front and rear, but don't worry about your tweaking options; in addition to shock angle, the shock-spring preload and toe in/out position are all adjustable. I'll be running the stock setup, however; the Vortex seems to be built spot-on right out of the box, with a couple of degrees of rear toe-in, a little negative camber up front and zero bump-steer. Even the steering angles of the tires look good; there's a molded link that joins the steering bell-cranks, which are bolted to the chassis plate. I've seen other "RTR" cars that were more ready-to-rebuild than they were ready-to-run. Not so with the Vortex; MRC done built it right.

DRIVE TRAIN

Long gone are the days when R/C manufacturers offered wildly different transmission designs in their buggies. Since the advent of the "3-gear" transmission, similar units have appeared on the tails of just about every competitive 2WD electric buggy currently offered. The Vortex comes with its own 3-gear design, complete with a bottom-mounted ball differential to spin the car's dogbone drive axles. Although my sample car's diff seemed to function correctly, it had an odd, rubbery feel to it. I tore it down to check for trouble, but everything was fine; MRC packs the diff with an unusually tacky lube, which caused the rubbery action. I rebuilt the diff

The 3-gear tranny performs quite admirably. An aluminum motor plate is a welcome addition. Check out the nifty rear bumper—nice touch.



The front bulkhead provides a decent amount of front rake for increased high-speed stability; extra-long suspension arms and big-bore bouncers favor the rough stuff. The molded upper links prevent the camber from being adjusted, but the Vortex comes with a couple of degrees of negative camber built in.



Building & Setup Tips

Since my Vortex came pre-built, my file of building tips is pretty slim. MRC thoughtfully includes the same excellent, CAD-illustrated assembly manual as the kit-version Vortex comes with, so you'll be able to maintain and rebuild the car with confidence. Here are some setup and operating tips.

- The Vortex is well-adjusted right out of the box, and with its non-adjustable links, you won't be altering the suspension geometry very much. I did want to lower the car's ride height, however, but the shock's pre-load collars were already as high on the shock body as they could go. What to do? First, remove the shocks, pull off the springs and remove the shock collars. Notice the thin lip on both the top and bottom of the shock collars; the spring seats against it. There is a lip on both sides so that MRC's assemblers can build the shocks without regard for the direction of the collars. We don't need to worry about that; we can go ahead and trim off one of the lips and allow the shock collars to slide further up the shock body. Now the shocks should have a little sag, which will give the car greater stability in the rough.

- The Vortex doesn't need a lot of maintenance, but you'll want to keep an eye on the mechanical speed control. As with any mechanical unit, clean contacts are critical to reliable performance. Prevention is the key; just give the contacts a wipe after each run. If the contacts are too dirty for just a swipe with a rag, then spray a little denatured alcohol onto the unit to get out the crud. Television-tuner cleaning spray also works well. Be sure to disconnect the battery first, or you might nudge the control into gear; you don't want to know just how quickly an R/C car can penetrate drywall.

- After your deep love for R/C cars has been affirmed, you'll probably want to upgrade to an electronic speed control. Remove the mechanical control and its servo, and you'll find a ready-made shelf above the battery tray: a perfect spot to mount your new ESC. I went a step further and enlarged the shelf by attaching a plastic plate; I secured it with screws that are already in the chassis. This provides the ESC with more servo-tape area for a better bond and allows me to remove the ESC by unscrewing the mounting plate. This is much easier than prying off the ESC, then re-taping. It isn't a must, but to clean up the chassis I removed the mounting tabs for the throttle servo. I'm confident that I won't be re-installing the mechanical unit, and I bet you'll feel the same once you've driven with an ESC.

- When you glue the tires, watch for excess glue that might leak from the rims' vent holes. If you're not careful, you might glue yourself to the rim.

- After putting so much thought into the Vortex, the gang at MRC must have been too pooped to come up with a killer set of graphics. The decals included with my kit sport some tame stripes and incredibly faint Vortex logos. The logos are nothing more than very thin outlines, with no backing color to fill in the letters. They virtually disappeared on the car, so I resorted to stick-on vinyl letters from an office supply store. Lame-o is my name-o! Newer production kits, however, offer improved decals.

THINGS YOU'LL NEED

- Lexan-compatible paint.
- 2-channel, land-based radio with two servos (if you opt for the kit version).
- Six-cell, "stick"-type battery pack.
- Battery charger.
- Cyanoacrylate cement (aka CA or super glue).

MRC VORTEX

with Associated* Stealth lubricants, which freed things up but also brought out a slight "notchiness" in the diff that the thicker kit lube had masked. Plastic bushings support the differential, the other internal gears and the top shaft, and an aluminum motor plate ties everything into the 20-turn stock motor that's included. MRC does offer a full ball-bearing package for the Vortex. The lower turn count (20 versus the usual 27) makes for some extra "scoot." Everybody wants that! MRC gears the Vortex for a balance of speed and torque, but you can use any aftermarket, 48-pitch pinions to tailor the gear ratio to your particular needs. Two additional spur gears are supplied with the model, which will allow a variety of gearing combinations.

WHEELS AND TIRES

In the front and rear, the Vortex has white, dish-type wheels in the industry-standard 2.2-inch size. Although recently, the trend has been toward spoked designs, dish wheels are still a popular and practical choice for an off-road car, thanks to

their high strength-to-weight ratio and dirt-shedding capabilities. The included MRC tires are molded of a firmer material than the super-soft tires most racers use—good thing, since the average Vortex pilot will probably be zooming his car around the driveway as much as on a vacant lot or racetrack. As for tread design, the front skinnies are a 4-rib design and very crisply molded—they should bite well. Five-row, pin-spoke tires are mounted in the rear; they feature a very flat, low-profile carcass. Foam liners are not supplied, but the firm tire compound seems to offer plenty of support nonetheless. The rims are heavily vented, which eliminates the need to poke holes in the tires. All you have to do is glue 'em up with a little CA.

TEST GEAR

Some ready-to-run kits supply a private-label radio, but MRC serves up a gen-yew-ine



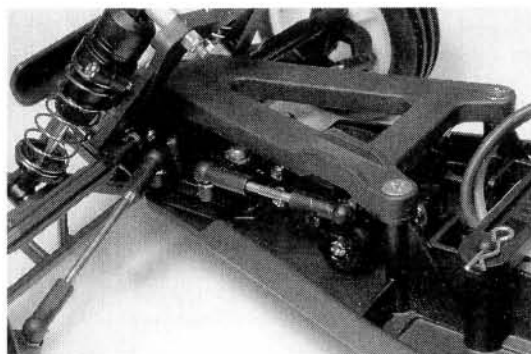
Likes

- **The Vortex is tougher than Popeye after a spinach binge!**
- **With its 20-turn motor, the car is fast right out of the box.**
- **Plenty of jumping prowess.**



Dislikes

- **Transmission does not accept "standard" spur gears.**



Above: the chassis is reinforced with a molded upper support. A racing-style bellcrank keeps the tires pointed in the right direction. The toe angle is adjustable, and the upper links have several mounting options. These adjustments allow the racer to do some experimenting down the road.

Right: the RTR version comes with a 3-step mechanical speed control and Futaba radio gear installed on the chassis. The molded-in battery compartment makes battery changes a snap.



Futaba Magnum Sport transmitter and receiver. The Sport has proven itself reliable and rugged in the hands of countless R/C beginners, and it's a good match for the Vortex. Two S148 servos are mounted on the chassis: one for steering and the other to operate the 3-step, mechanical speed control. Although the steering servo is secured by individual mounting blocks, the speed-control servo is screwed into bosses that are molded into the chassis. The speed control itself sits above the battery pack, and the resistor is mounted on the shock tower where it can get plenty of cooling air. Everything arrived correctly installed in the chassis, right down to the settings of the transmitter; the servo-reversing switches were set properly, as were the servo's neutral settings. Too easy! All I had to do to complete the car was to drop in a battery with a Tamiya-type connector. A Dynamite* Sport 1400 SCR was the perfect choice.

PERFORMANCE

I had the Vortex ready to "test" about two minutes after I took it out of the box, not including battery charge time (a whopping 15 minutes). OK, the body wasn't painted yet and the tires weren't glued, but I wanted to try it! I took a slow pull on the Magnum Sport's throttle trigger, yanked the mechanical speed control into first (slow creep), then second (fast walk) and finally third, which is probably a couple of clicks faster than you can run. Reverse is also a three-step affair, so you can run the car backwards at a pretty good clip—perfect for those Hollywood-chase-scene-style pirouette turns from reverse to forward. After running a pack in the street and on the driveway, I was ready to glue up the tires, paint the body and do some real driving.

My next excursion with the Vortex brought me to S&K Hobbies in Johnston, RI. I was there to do a little truck destroying ... I mean truck racing, and I brought the Vortex along for some fun between heats. The Vortex took to the loose stone-dust surface with an impressive spray from the rear wheels as the tires broke loose. Handling was a bit sketchy (the rear-end fishtailed around the track), but judicious countersteering kept the car pointed in the right direction. It didn't help that the Vortex has no slipper clutch to smooth out the mechanical speed control's one-two-three-punch power delivery. However, MRC does offer a slipper clutch assembly. The suspension setup wasn't really racetrack material either; the Vortex would have probably coped better if the suspension hadn't been set so high. Although the jacked-up, no-sag suspension soaked up bumps well, the

(Continued on page 196)

the Competition	Kyosho Outrage	Losi Junior 2	MRC Vortex	Traxxas Bandit
Wheelbase	10.88 in.	11.25 in.	11 in.	10.75 in.
Width (F/R)	8.8 / 9.63 in.	9.25 / 9.63 in.	9.75 / 10.6 in.	10 in.
Weight	3 lb., 4.9 oz.	3 lb., 3 oz.	3 lb., 7.5 oz.	3 lb., 10 oz.
Diff type	Gear	Ball	Ball	Metal planetary gear
Chassis	Aluminum	Molded channel	FRP**	Nylon composite
List price	\$119.95	\$199.95	NA	\$150
Available at*	\$69.99*	\$69.99*	\$99.99* w/o radio \$179.95 w/radio	\$89.99* w/o radio \$148.99 w/radio
Reviewed in	8/95	8/94	10/97	7/96

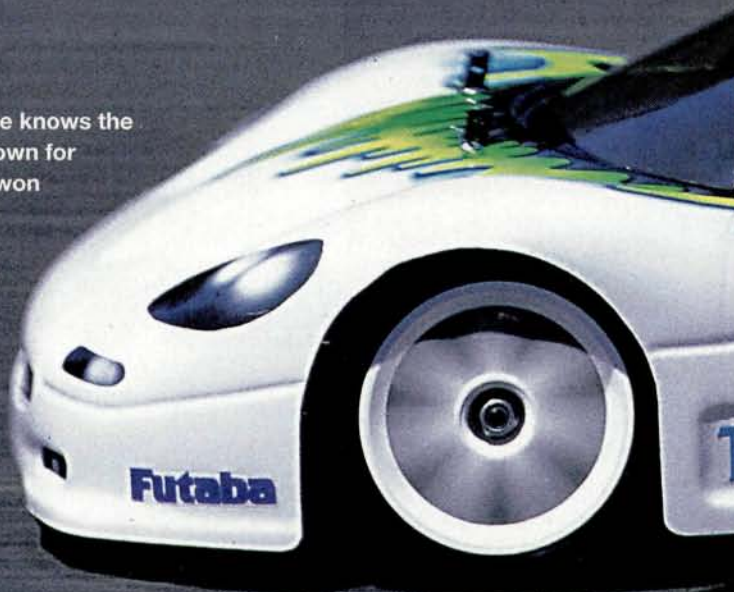
*Prices vary with location. **Fiber-reinforced plastic

thrash TEST

1/10 scale electric

YOKOMO YR-4 II by Peter Vieira

WHEN IT comes to 4WD off-road racing, no one knows the winners' circle as well as Yokomo*. Long known for their prowess in the dirt, Yokomo cars have won multiple world championships and numerous national titles. It wasn't surprising, then, that Yokomo reconfigured their class-leading YZ10 for sedan racing. Equally unsurprising was how well this new car, the YR-4, performed; given its championship lineage, the YR-4 seemed destined for success. Yet, just as Yokomo has continually refined the YZ10, so, too, has the YR-4 undergone evolutionary changes. Well, maybe I should change that to "revolutionary changes." The YR-4 II is here, and it represents new thinking in 4WD sedan design. But then again, it's no trick to be different. The key question is, "Does it work?" Read on!



specifications

SCALE 1/10
LIST PRICE \$250 (est.)

DIMENSIONS

Length (overall) 15 in.
Wheelbase 10.125 in.
Width (F/R) 7.0/7.125 in.

WEIGHT (gross, RTR) 3 lb., 2 oz.

CHASSIS

Type Upper and lower plate
Material Fiberglass

DRIVE TRAIN

Type Belt
Primary Pinion/spur
Transmission Universals
Differential(s) Ball type
Slipper clutch None
Bearings/bushings Shielded ball bearings

SUSPENSION

Type (F/R) Lower suspension arm
w/turnbuckle upper link
Damping Oil-filled, coil-over
micro shocks

WHEELS (F/R)

Type One-piece plastic
Dimensions (F/R, DxW) 2x1 / 2x1.25 in.

TIRES (F/R)

Type Hot Laps slick w/foam insert

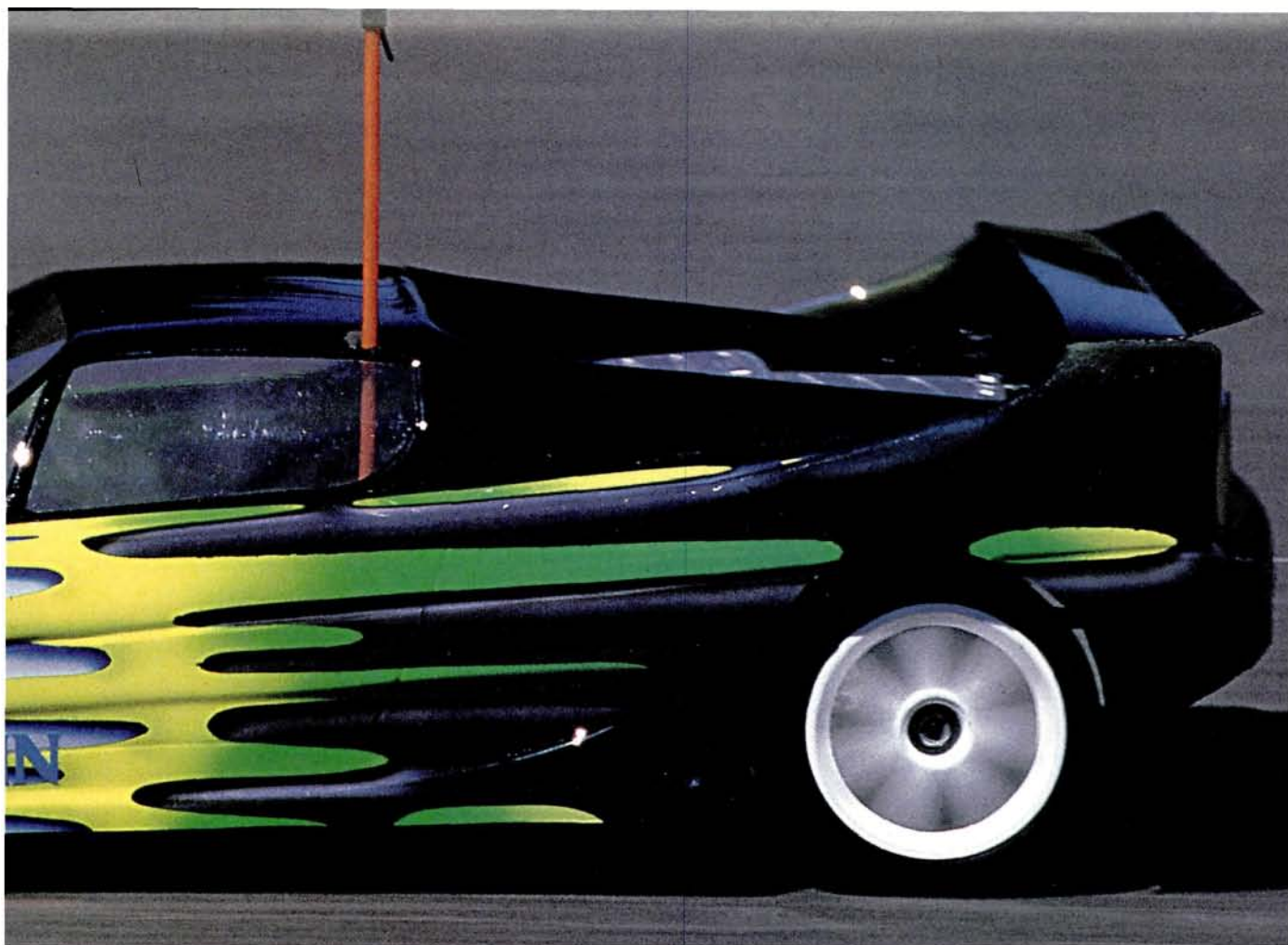
ELECTRICS

Motor, battery, ESC Not included



Batteries on the right; electrics on the left.
The YR-4 II's design makes it easy to mount all your gear.

SETTING A NEW STANDARD IN



PHOTOS BY JOHN HOWELL AND WALTER SIDAS

KIT FEATURES

The heart of the YR-4 II and the source of its uniqueness is its double-deck fiberglass chassis. Although a fiberglass chassis is nothing new, this particular chassis' configuration is very trick. The batteries are loaded into battery cups along the right side of the chassis plate—a radical departure from the usual across-the-width battery placement of the original YR-4 and every current stick-pack sedan. To avoid having a fixed right-side weight bias, the batteries do not run parallel to the chassis' centerline. Instead, the pack is angled in toward the front bulkhead, and the innermost corner of the pack just tucks under the chassis' top plate. This, combined with the weight of the motor and electrics on the car's left side, balances it and leaves a ton of room for electrics. In addition, this configuration allows the motor, differentials and spur gear to be mounted extremely low in the car with unimpeded belt runs to each differential. That means a lower center of gravity to

improve handling and less friction to provide more power to the wheels.

There's more. The fiberglass chassis plate is very flexible, even with the top plate installed. The top plate is mounted with a single ball joint at one end of the car and held by an aluminum post and body clip at the other. Because there are only two contact points, the upper deck doesn't add torsional rigidity. This is not a design flaw, however; the YR-4 II is meant to be flexible. The top plate's function is to allow belt-tension adjustment; by threading the ball joint that is attached to the front pivot ball inward or outward, the top plate can be made to flex the chassis and tighten or slacken the belts. This allows you to make very precise adjustments without adding another pulley to the drive train—pretty slick. "What's the spring for?" you ask. Yokomo hasn't clearly explained its function, but they clearly specify the need for a certain amount of preload. The spring "shock absorber" appears to push out against the

front bulkhead, but it actually doesn't. Flexing the chassis fore and aft, as though it were hitting something head on, will compress the spring. I'll go on record to say that the spring is not a tuning aid but a safety device. And all that chassis flex? We'll see what happens when the YR-4 II hits the track.

Yokomo's star sedan also breaks new ground in the suspension department. Other sedan designs are suspended by shortened off-road-type dampers. The YR-4 II takes the concept a step further and also reduces the diameter of the shock body. Although there is no bladder for volume compensation, the red-anodized micro shocks work incredibly smoothly. In addition, there seems to be less shaft deflection, and the shocks are much lighter than the big-bore variety. No less important (to me!), the coolness factor of the little red dampers is undeniable; they're trick!

The other components of the YR-4 II's suspension follow proven concepts.

TOURING CAR TECHNOLOGY?

Building & Setup Tips

It's ironic, but often, the super-expensive, boutique-brand cars are the biggest bears to build, with lots of hand-fitting and instructions that seem to have been put together by the guys who design tax forms. Not so with the YR-4 II! I did zero hand-fitting and had all the pieces, and the instructions were perfectly clear. One caveat: the instructions aren't as emphatic as those of some other kits when it comes to saying, "Warning: we know you'll screw this up unless we warn you." Carefully examine each step before you put the pieces together, and you'll do fine. Of course, the following tips can't hurt either

• **Page 3: installing the motor mount.** No biggie here; just use bit of mild threadlock on the mounting screws that hold the magnesium mount—always a good idea when you put screws into metal.

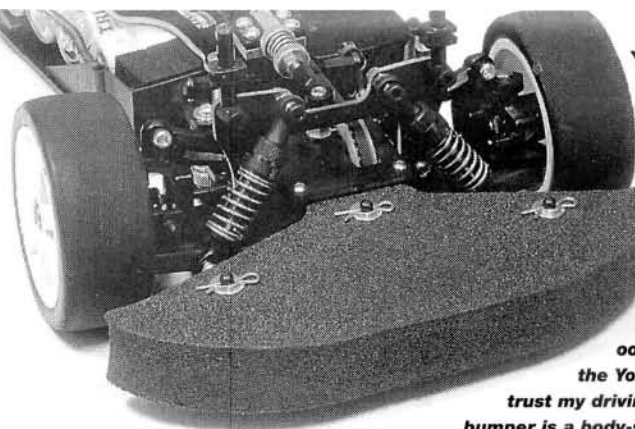
• **Page 6: differential assembly.** Watch the position of the diff pulleys. The illustration is correct; be sure to look at it. If you don't, you'll build beautifully smooth backward diffs. Also, do yourself a favor and pick up some ball-diff lube and thrust-washer grease because the kit doesn't include them. I like the Associated Stealth stuff myself.

• **Page 7: assembling steering linkage.** Metal posts. Metal screws. Threadlock. Do it.

• **Page 9: mounting center shaft and diff pulley.** Once the rear bulkhead has been assembled, you won't be able to get at the screw that holds the post for the top plate. If you want the body pin to be perpendicular to the top plate after assembly, now's the time to mount the post right! As much as it bugged me to have my body pin off-center, I didn't have the heart to take the car apart just for that.

• **Page 15: assembling shock absorbers.** Take a few extra minutes to get all the air bubbles out of the shock fluid. The little dampers don't hold much oil, so they are especially sensitive to trapped air. I used Associated 30WT silicone fluid instead of the kit oil.

As for car setup, the YR-4 II sports a decent number of adjustments. You can monkey with front and rear camber, shock-oil weight, shock-spring preload and battery placement. You can move the battery pack fore and aft by placing a foam spacer block in front of or behind the pack; I ran my batteries all the way back to get a little more bite in the rear. Depending on your choice of electronics and motor, the YR-4 II will be "tweaked" because of the battery's weight; use the included shock spacers to correct this (hint: the car is tweaked if it steers well in one direction but pushes, or "hooks," in the other).



YOKOMO YR-4 II

Either the YR-4 II is a big car, or those are little shocks. The Yokomo mini-dampers are smooth. It appears that the Yokomo engineers don't trust my driving. The healthy foam bumper is a body-saving plus.

Lower suspension arms are linked to the front and rear bulkheads, while an adjustable upper link allows camber adjustments to be made. Camber-link options are limited, however, as the YR-4 II's fiberglass shock towers provide only one mounting hole for each

link. Likewise, both front and rear hubs have only one position for the camber link. Yokomo makes the most of the narrow sedan format by placing the hinge pins for the hubs well inside the rims, effectively increasing the leverage of the wheel on the suspension arm and making the suspension more responsive. Many sedans I've built place the hub's pivot point as much as $\frac{3}{4}$ inch away from the center of the rim, and this can inhibit the system's responsiveness. The YR-4 II's molded suspension parts are nothing if not beefy. Forget the webby, relieved, intricately designed suspension arms of other cars; whereas *they* are industrial chic, the

YR-4 II is simply industrial. The suspension arms are thick slabs; the hubs, square-shouldered blocks. I like it! The YR-4 II has all the subtlety of a punch in the nose—perfect for a racecar.

That form-follows-function design philosophy is also apparent in the YR-4 II's drive train. Although dual belts are now *de rigueur* for competitive sedans, Yokomo's layout reaches a new level of simplicity. A thick magnesium casting serves as a motor mount and base for the center shaft. This casting extends to the end of the chassis to prevent the motor's torque from flexing the chassis plate instead of driving the rear wheels. Both front and rear belts stretch from the spur-driven center shaft to their respective differentials without needing a single extra kink or turn to get around chassis parts or electrics. The diffs themselves are exceptionally smooth ball units in boxy, unvented bulkheads. To help prevent debris from getting wedged between the rear diff and the chassis, there's a hole in the bottom of the chassis just ahead of the rear belt. That should help, but I'll still be careful on dirty lots.

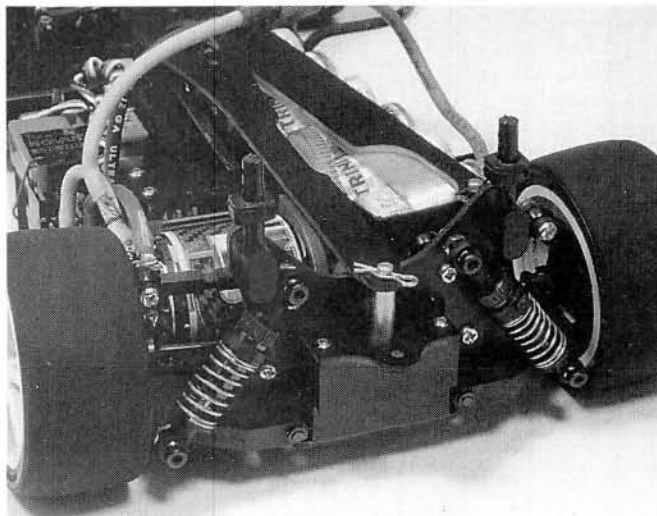
The only real flaw of the YR-4 II's drive system is the spur gear. Because it is keyed to the center shaft, you

THINGS YOU'LL NEED

- 2-channel surface-frequency radio set with one standard servo.
- Electronic speed control (ESC).
- Motor.
- Body.
- Lexan-compatible paint.
- 7.2V battery (stick pack or 3x3 OK).
- Battery charger.

FACTORY OPTIONS

- Carbon-fiber chassis set—part no. ZR-TGS.
- Rear swaybar—ZR-412R.
- Aluminum kingpin set—ZC-414A.
- Slipper clutch—ZC-607C.
- Carbon-fiber shock towers—ZR-017TG.

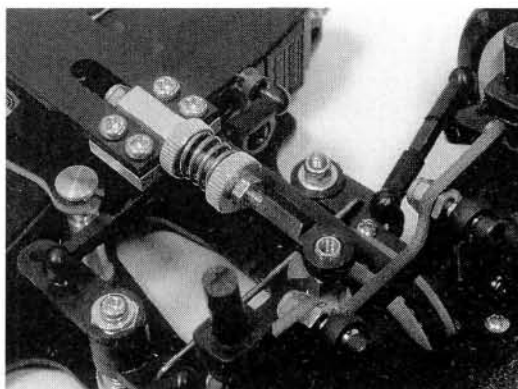


Adjustable camber, universal drive shafts, bearings; this is an all-business touring-car rear suspension. You want belt access? I got your belt access right here; just pop off a body clip—no tools required.

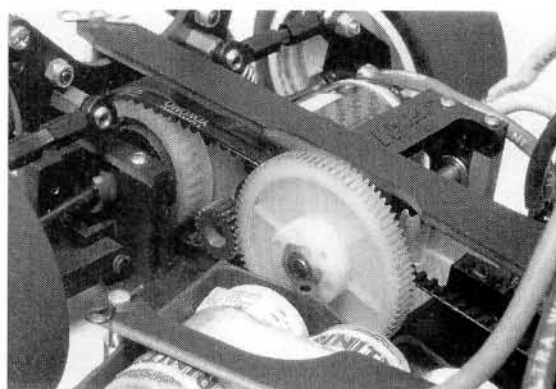
YOKOMO YR-4 II

cannot remove it without taking apart the entire center-shaft assembly. In addition, the spur gear is a specialized Yokomo part and cannot be replaced with the spurs that are floating around in your pit box. This limits gearing options and can result in a DNF if you fry a spur and the hobby shop that's hosting the race doesn't stock parts for the Yoke (note: Yokomo's optional slipper clutch accepts standard two-hole mount spurs).

For the final transfer of power to the ground, the YR-4 II sports some goeey gumballs at all four corners. No namby-pamby, narrow-tire stuff here; the II has "standard"-width tires up front and 31mm rear "steamrollers" that give the car a seriously muscular look. Foam inserts are included for Yokomo's Hot



The YR-4 II's bellcrank steering is very smooth and incorporates a servo-saver. Note the crud escape hole in the chassis. Hmm, what does that little spring do? Probably not what you think. Read the test!



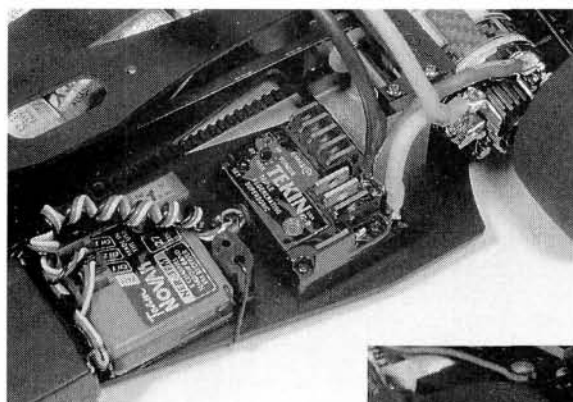
The YR-4's low CG motor mount. Not much room between the pinion gear and rear ball diff. Note how close the rear tire and rear diff are to the motor. This is an efficient drive train!

Laps formula rubber, and their seven-spoke wheels complete the wheel/tire package. Steel universals get the spin into the rolling stock, and a smooth bellcrank steering system with adjustable servo-saver keeps the front wheels pointed where you want to go.

TEST GEAR

The YR-4 II has a ton of room for the electrics, so I can mount any standard-size receiver and servo without the concern about space limitations that I would have with other cars. Tekin's* G12c speed controller is a favorite of mine and was an easy choice for power delivery. A Novak* NER-3FM receiver handles the radio waves chores.

I installed a new Trinity* GT-1 powerplant. If you're looking for an inexpensive, reliable way to add serious horsepower to any car, Trinity's newest mods are tough to beat. I used Trinity 30A 2000 SCRC cells to power the car. I was supplied with a Yokomo Ferrari F50 body painted by Yokomo. The black-and-white-with-lime-



■ Above: tons of room on the chassis for mounting electronics. The ESC is close to the motor, so wire length is kept to a minimum.

■ Right: the YR-4 comes equipped with classic Yokomo 7-spoke wheels and Hot Laps slick tires with foam inserts. The tires provide excellent grip on clean surfaces.



Likes

- High-quality parts.
- Uncompromised "straight-shot" drive train.
- Spacious chassis.
- Neato mini-shocks.
- Chassis rewards precise driving.

Dislikes

- Chassis does not forgive sloppy driving.
- Neato mini-shocks don't accept "regular" springs.
- Limited tuning options.
- Must use Yokomo spur gear.

green-splatter look is cool, but I doubt Enzo would approve. The body was just too nice to hammer on, so I saved the F50 for photos and tested the YR-4 II with a Tamiya* "Tom's Levin" body. I was ready to drill some new body-mount holes, but I was able to pop the Tamiya body right on without modification. Cool!

PERFORMANCE

I tested the YR-4 II on grippy new pavement, which is always a plus when dealing with a slipperless, hot-horsepower car. Thanks to the Hot Laps tires' killer traction, the YR-4 II launched off the line straight and true and fast as heck. I wound out the Trinity motor at what I would guess to be about 35mph (remember, 35mph actual speed is equal to about 55mph bench-racing speed). At the end of

(Continued on page 195)

The Competition

	HPI RS4 Pro	Roadrunner XPress	Kyosho TF-2 Type R	Schumacher SST 2000	Tamiya TA03F-Pro	Yokomo YR-4 II	Tenth Technology Predator DTM	Tech Racing Voggerd
Wheelbase	10 in.	10.25 in.	10.19 in.	10 in.	10.1 in.	10.125 in.	10 in.	10.375 in.
Width (F/R)	7.25/7.125 in.	7.25 in.	7.38 in.	7.125 in.	7.19 in.	7/7.125 in.	7.25 in.	7.25 in.
Weight	2 lb., 8 oz.	3 lb., 2.8 oz.	47.8 oz.	3 lb., 7.3 oz.	3 lb., 8.7 oz.	3 lb., 2 oz.	50.6 oz.	3 lb., 7.9 oz.
Diff type (F/R)	Ball	Ball	Bearing/ball	Ball	Ball	Ball	Ball	Ball
Chassis	Carbon fiber	Carbon fiber	Carbon fiber	Fiberglass	FRP**	Fiberglass	Nylon comp	G-10 fiberglass
List price	\$399	\$385	\$399.99	\$319.50	\$356	\$250 (est.)	\$479	\$289.99
Available at*	\$239	\$225	\$299.99	\$190	\$199.99	\$140 (est.)	\$320	\$189
Reviewed in	9/97	4/97	1/97***	12/96	10/96	10/97	7/96	10/97

*Prices vary with location. **Fiberglass-reinforced plastic. ***Touring Car shootout.

TECH RACING **Voggerd**

by George M. Gonzalez

AS THE POPULARITY of touring cars continues to rise in the U.S., new models are being introduced by companies that were once known primarily for their aftermarket hop-up parts. Some now design and manufacture complete touring-car kits that are intended to compete with those of industry giants such as Tamiya, Kyosho and Yokomo. One such company is Tech Racing (distributed in the U.S. by GTP*); it has built a reputation on rather bold designs.

Tech's newest entry in the growing touring-car market is the Voggerd T-10, which boasts some revolutionary features. As you may have figured out by now, I'm fascinated by bold, new concepts and have a passion for the unusual. I guess my co-workers are aware of this, because I found the Voggerd T-10 on my desk with a note that read, "This car is right up your alley, G-Man." Join me in a little test drive and take the Voggerd T-10 through its paces.



TEST GEAR

- Airtronics* CX2P FM transmitter and receiver.
- Tekin* G12c ESC.
- Futaba* S9304 steering servo.
- Pro-Match* 2000mAh 6-cell stick pack.
- Trinity* Dirtinator 11-turn triple.
- Robinson Racing* 38-tooth, 64-pitch pinion gear.
- Kose 3-spoke wheels (super-narrow front, standard-width rear).
- Parma touring-car radial tires (super-narrow front, standard-width rear).
- Cross Racing Cerumo Toyota Supra body.
- TD Enterprises Protector 1/12-scale foam bumper (cut to fit).

specifications

SCALE 1/10
LIST PRICE \$289.99

DIMENSIONS
Length overall 13.75 in.
Wheelbase 10.375 in.
Width (F/R) 7.25 / 7.25 in.

WEIGHT (gross, RTR) 3 lb., 7.9 oz.

CHASSIS
Type Dual-plate
Material G-10 fiberglass

DRIVE TRAIN

Type Belt-drive 4WD
Primary Pinion/spur
Transmission Dogbones
Differential(s) Twin ball diffs
Slipper clutch No
Bearings/bushings Metal bushings

SUSPENSION (F/R)

Type Upper and lower suspension arms
Damping Oil-filled shocks

WHEELS (F/R)

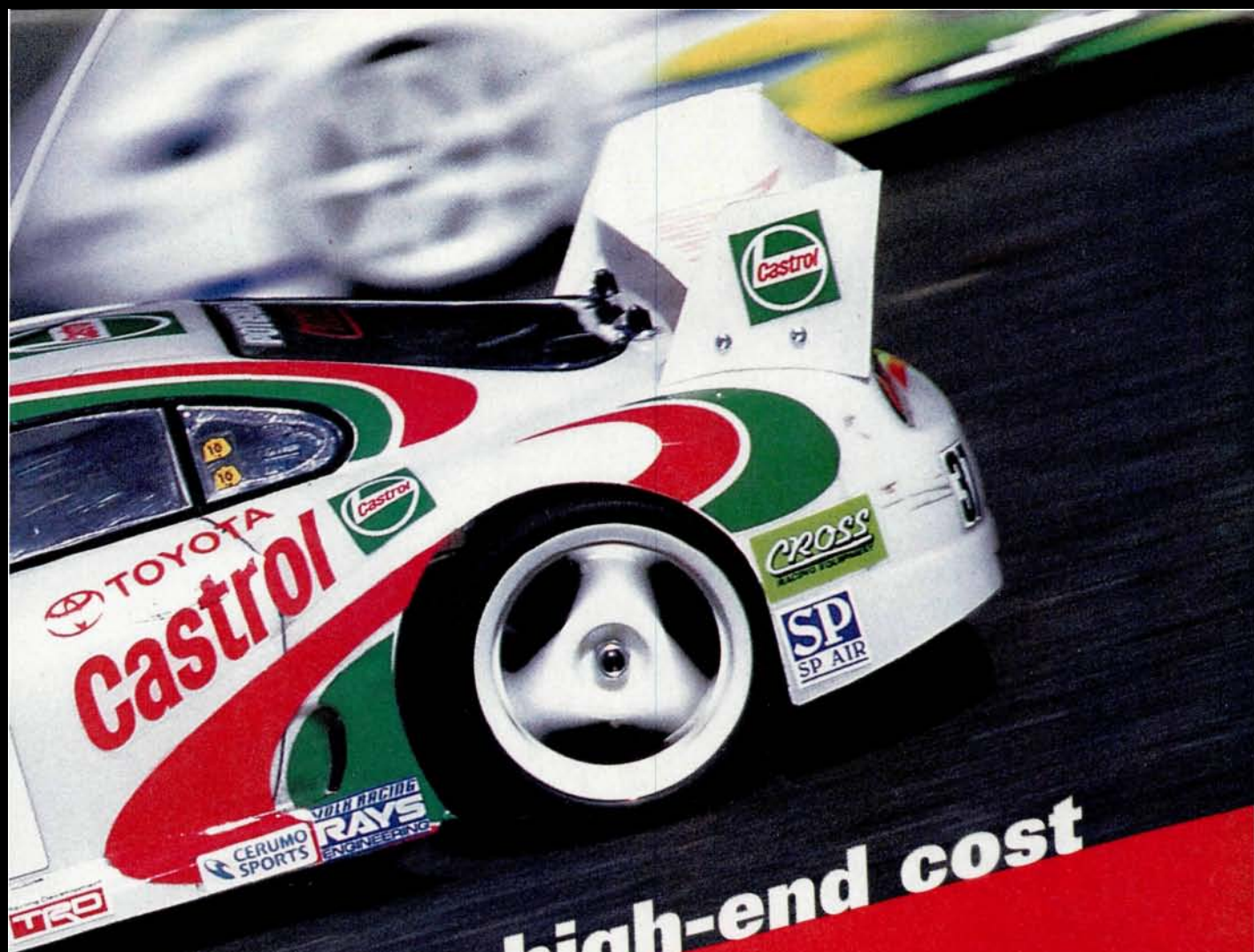
Type One-piece plastic
Dimensions (DxW) 2x1 in.

TIRES (F/R) Standard-width rubber slicks

ELECTRICS

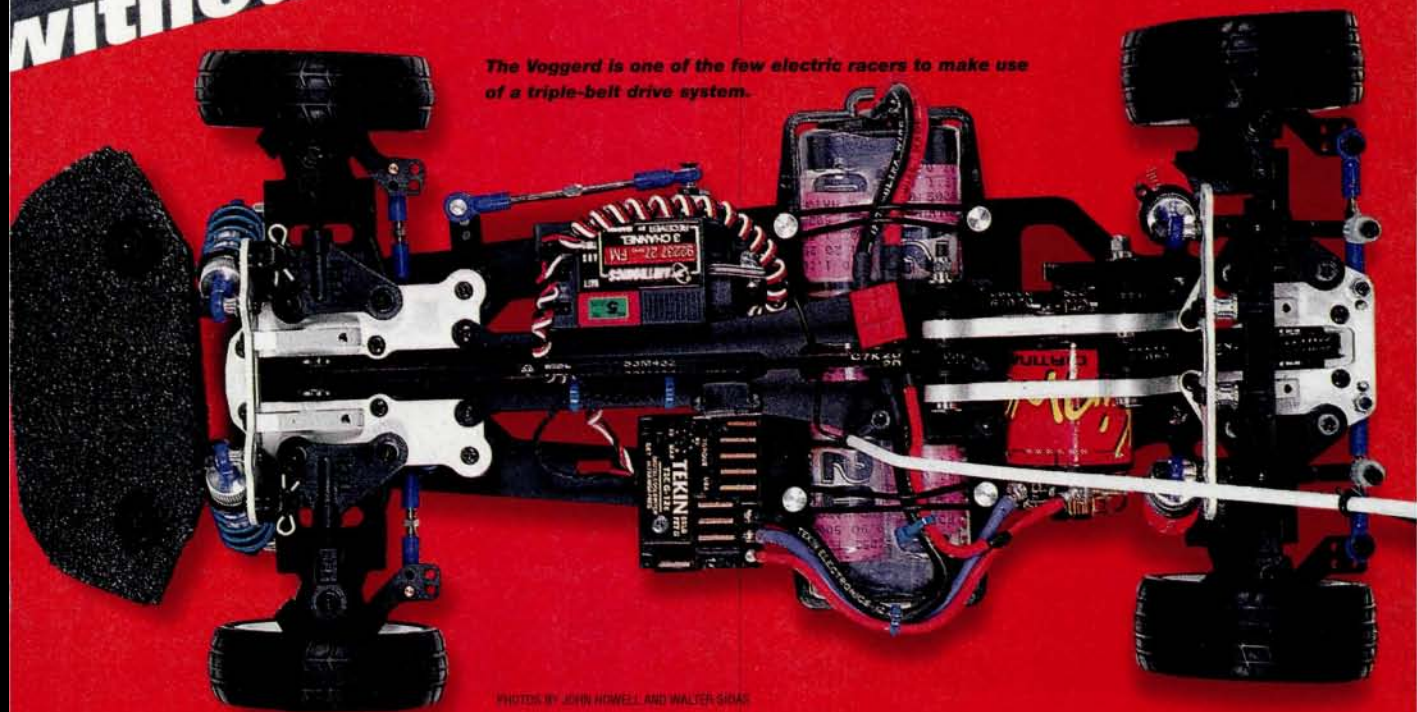
Motor, battery, ESC Not included

A high-end exotic



without the high-end cost

The Voggerd is one of the few electric racers to make use of a triple-belt drive system.



PHOTOS BY JOHN HOWELL AND WALTER SHANK

KIT FEATURES

• **Chassis:** the Voggerd T-10 features a traditional double-deck chassis, with G10 fiberglass lower and upper plates; however, because the plates are thin, the assembled car flexes slightly. Perhaps a graphite upper plate would resolve this slight ailment (Tech Racing offers one). In all fairness, though, the slight flexing did not give the car any nasty habits on the track.

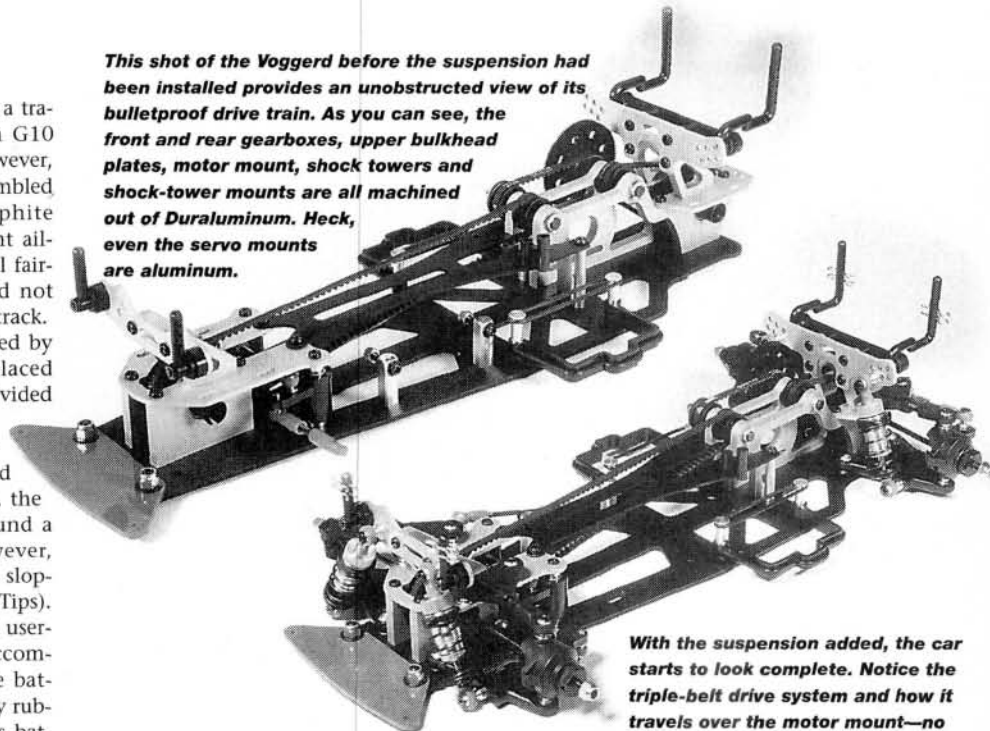
The steering bellcrank is supported by plastic bushings; these can be replaced with bearings. No servo-saver is provided on the bellcrank system, but there's one for the servo. I found the bellcrank to be riddled with slop, and after I installed the center drag link, the entire system started to bind. I found a quick fix for these problems, however, and the unit now provides smooth, slop-free steering (see Building and Setup Tips).

One of the car's best features is its user-friendly battery holder that will accommodate both stick and side-by-side battery packs, which are held in place by rubber O-rings. Overall, the unit makes battery changing quicker and easier, and the unit also looks very trick. When I race the car in competition, however, I may use strapping tape to secure the pack because I don't completely trust those O-rings.

• **Drive train:** the Voggerd uses a triple-belt-drive system similar to those in many glow-powered vehicles. The belts follow a clear path over the motor and batteries without the need for belt tensioners. Two high-quality, amazingly adjustable ball diffs are at each end of the car. To keep the car affordable, dogbones are included instead of universal swingshafts, and the kit comes with a complete set of Oilite metal bushings.

Overall, the system is very trick, but when I installed it, I noticed that the tight center and rear drive belts caused a sinful

This shot of the Voggerd before the suspension had been installed provides an unobstructed view of its bulletproof drive train. As you can see, the front and rear gearboxes, upper bulkhead plates, motor mount, shock towers and shock-tower mounts are all machined out of Duraluminum. Heck, even the servo mounts are aluminum.

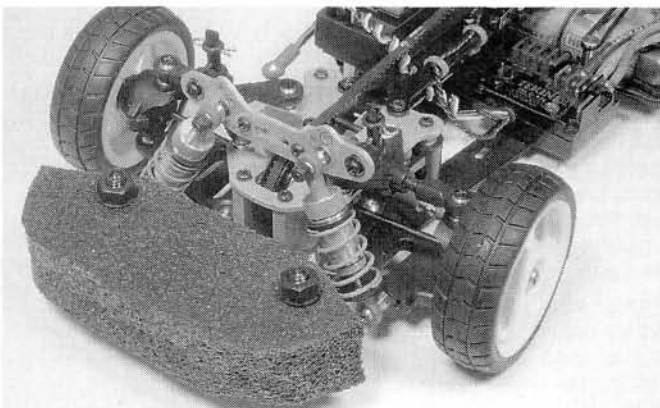


With the suspension added, the car starts to look complete. Notice the triple-belt drive system and how it travels over the motor mount—no need for belt tensioners.

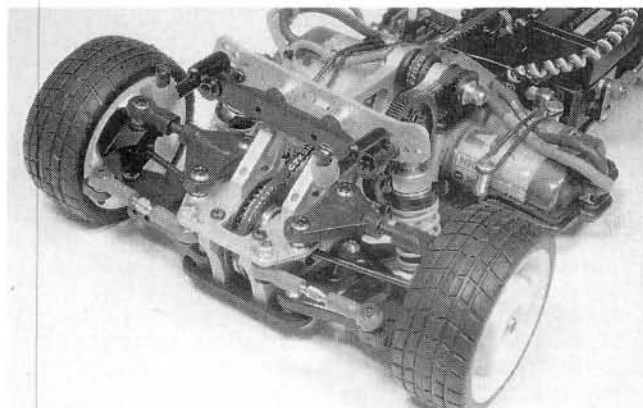
amount of binding. When I called GTP's representative to express my concern, I was told that they are addressing this problem. They sent me a complete bearing kit; the moment I installed it, the binding problem disappeared.

• **Suspension:** traditional lower suspension arms with adjustable upper wishbones. It's interesting that the suspension arms pivot on pillow balls instead of on hinge pins. The suspension's performance is awesome! This is also by far the most adjustable car I've ever built; I'm impressed! Camber, caster and toe-in/out are adjustable on both ends. In addition, the shocks and steering links have a multitude of mounting choices, and the car's roll center can be adjusted with washers.

The shocks feature aluminum bodies, caps, seals and pistons, and each one uses five O-rings to ensure smooth, leak-free operation. The most interesting features, however, are the internal sleeves and spring-loaded baffles. Because the internal shock pistons slide up and down on internal sleeves, not on the shock bodies, the shock bodies should last a very long time; shock sleeves are also much cheaper to replace than shock bodies. The spring-loaded baffles provide progressive damping throughout the full range of shock travel (the shocks become stiffer as the suspension is compressed—kind of like progressive springs, except in this case, the shocks benefit from progressive damping).



Front end: caster, camber, toe-in/out and roll center are adjustable. In addition, the shocks and the steering links can be mounted in several positions. One of the smoothest ball diffs I've tested is found between these gearbox halves. The TD Enterprises bumper was added for extra crash protection.



Everything is adjustable back here, too—including anti-squat and toe-in. Notice how the upper wishbones and lower suspension arms pivot on pillow balls—very unusual, but very effective.

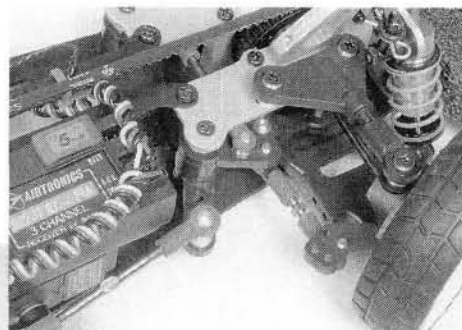
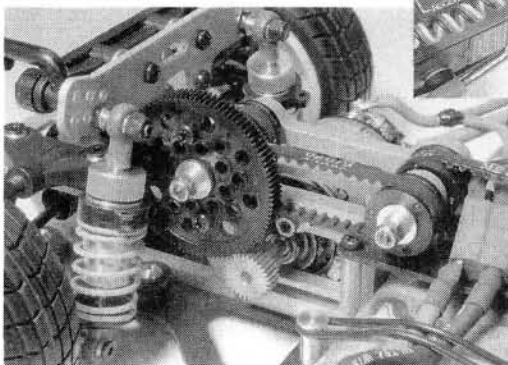
TECH RACING VOGGERD

• Odds and ends: a complete set of 3-spoke, standard-width wheels and rubber slick tires with foam inserts. I chose to use a complete set of Kose* 3-spoke wheels and Parma* touring-car radials (super-narrow front, standard-width rear) only because I had those tires already glued to the wheels.

The kit also comes with a standard 64-pitch spur gear and a 30-tooth pinion gear that provide a gear ratio that's suited to a silly-wind modified motor (way undergeared for your run-of-the-mill 11- to 15-turn modified motors). Of course, you'll need to experiment with gearing to get the car dialed on a particular track, so having several other pinion gears in your toolbox will be a smart choice.

Like most high-end touring-car kits, the Voggerd doesn't include a body. I was

Right: the Voggerd's steering bellcrank needs some tweaking, but overall it works very well. I added Lunsford titanium turnbuckles on the steering links to make toe-angle adjustment easier. I'm still looking for adjustable turnbuckles for the upper wishbones. Note the many steering-link mounting choices on the steering arms.*



Left: I replaced the stock 30-tooth, 64-pitch pinion gear with a Robinson Racing 38-tooth pinion gear. With the stock pinion gear, the car was severely undergeared. My car went from 28mph to 38mph with just a change of gears. Thanks to its universal spur gear mount, just about any spur gear will fit the Voggerd.



Building & Setup Tips

BUILDING TIPS Included in the kit are a 12-page instruction booklet and a 10x15-inch full-size hardware-identification sheet. Throw away the setup sheet; the recommended setups gave my car too much toe-out up front and too much toe-in out back, and the ride height was way off. I provide a complete setup chart below, but here are some tips to make assembly a little easier.

- Use the full-size hardware-identification sheet to measure all screws, nuts, washers, etc. The instruction booklet also identifies the parts, but the parts are scaled down.
- Use liquid thread-lock on all the screws that come into contact with metal.
- Install bearings as soon as you can. If you must use the bushings, apply a few drops of Paragon's* Liquid Bearings to each.
- The supplied diff lube is adequate, but you can use Associated Stealth diff lube on the diff balls and Associated black grease on the thrust-washer assemblies. You'll be very pleased with the diff action. Oh, and don't forget to use the supplemental washers (provided in the diff parts bag) under the diff locknuts, or you'll never get the diffs tight.
- Be careful when you build the steering rods. The supplied blue ball ends are very soft and can easily be deformed. Also, don't thread the rods too far into the ball ends, or you'll be faced with a serious binding problem. If binding is evident when you install the ball ends on the ball joints, remove the ball ends and squeeze them gently with pliers until they operate freely.
- To ensure there's no slop in the the steering-bellcrank system, glue the steering arm halves (part nos. PP13 and PP12) together with CA. Also, be sure the center steering link doesn't bind (those soft blue ball ends again).

the Competition

	HPI RS4 Pro	Roadrunner XPress	Kyosho TF-2 Type R
Wheelbase	10 in.	10.25 in.	10.19 in.
Width (F/R)	7.25/7.125 in.	7.25 in.	7.38 in.
Weight	3 lb., 8 oz.	3 lb., 2.8 oz.	3 lb., 3.5 oz.
Diff type (F/R)	Ball	Ball	Bearing/ball
Chassis	Carbon fiber	Carbon fiber	Carbon fiber
Price	\$399	\$385	\$399.99
Available at*	\$239	\$225	\$299.99
Issue Reviewed	9/97	4/97	—

*Prices may vary with location **Fiberglass-reinforced plastic

• When you install the suspension arms, note that three types of pillow balls are used. Be sure that all go in the right place, or your car will end up tweaked. To select the correct pillow ball, use the full-size hardware-identification sheet.

• Be sure the bushings that go into each axle carrier are seated properly. I had to use a vise to install my bushings. If the bushings are not seated correctly, the axles will bind as soon as you install the hubs and drive pins. Chamfering the inside edges of the axle carriers will facilitate installation.

• Each lower suspension arm has a setscrew that allows you to set the arms' down-travel—nice, except that it's impossible to adjust the setscrews after the car has been assembled. For this reason, I found this feature completely useless. Don't worry, though; this is something you can easily do without.

• When you build the shocks, note that four sizes of O-rings are used. It is imperative that the O-rings be installed in the right places, or the shocks will leak and provide inconsistent damping. Also, be very cautious when you screw the blue ball ends onto the shock shafts; put a small piece of fuel tubing or servo tape around the shock shafts so you won't scratch them when you grip them with pliers—very important!

• Because of the way the motor, batteries, speed control, steering servo and receiver are mounted on the chassis, the car has more weight on its left side (chassis is tweaked). For this reason, I had to add more spring pre-load to both the left front and left rear shocks.

looking for something a little different, so I ordered a Cross Racing* Cerumo Toyota Supra body from GTP. All Cross bodies are molded with performance—not scale looks—in mind, so some may question their authenticity. The body comes with all the decals needed to replicate the Cerumo/Castrol Supra you see on these pages, and the large rear wing comes with two different spoilers to vary rear downforce.

PERFORMANCE

The greatest thing about parking-lot racing is that you can set up a track just about anywhere. I went to an inline skate/hockey field across the street from our office. I took along several corner markers (Tamiya*, Kawada* and TD Enterprises*) and set up a track. So that I can get a feel for a car's overall handling traits, I usually include a long straight-away that leads into a sweeper, a short

chicane section and several switchback turns.

When I pulled on the trigger, I noticed that the car was drastically undergeared. It had enough get-up-and-go, but the top end just wasn't there. To record the car's speed, I had taken along a Speed Check* personal sports radar (read all about it elsewhere in this issue), and the Voggerd topped out at 28mph—not too impressive, considering I was running an 11-turn motor. I installed a 35-tooth pinion, then later went up to a 38-tooth before I was satisfied with the car's acceleration and top speed. This time, it topped out at 38mph—amazing!

Here's the verdict: as expected, the Voggerd is fast and smooth, and it handles exquisitely. It's extremely sensitive to tuning adjustments, and it's easy to divert traction to the front or rear without making drastic changes, such as changing tires. The car has a very subtle feel and is

very forgiving—even when overdriven. I set it up with a slight push, which suits my driving style just fine; I later switched to the smaller spoiler that came with the body (I originally installed the larger spoiler) and found myself dialing out steering—wow.

(Continued on page 197)

Likes

- Exceptional handling.
- The suspension pieces are interchangeable.
- Bulletproof Duraluminum drive train.
- Highly adjustable suspension.
- Awesome shocks.
- Great battery holder.
- Many cool factory options.

Dislikes

- Instructions could use more supporting text.
- Some construction steps are difficult (and definitely not for beginners).
- Setup tips provided don't work.
- There's some slop in the steering-bellcrank system.
- The included blue rod ends are too soft and can easily be deformed during installation; this will lead to binding.
- Plenty of pounding and hand-finishing are required.
- There's too much binding in the drive train (bearings are a must).
- Upper chassis plate could use beefing up (fore and aft flexing is inherent).

Schumacher GST 2000	Tamiya TA03F-Pro	Yokomo YR-4 II	Tenth Technology Predator DTM	Tech Racing Voggerd T-10
0 in.	10.1 in.	10.125 in.	10 in.	10.375 in.
7.125 in.	7.19 in.	7/7.125 in.	7.25 in.	7.25 in.
1 lb., 7.3 oz.	3 lb., 8.7 oz.	3 lb., 2 oz.	3 lb., 7 oz.	3 lb., 7.9 oz.
Ball	Ball	Ball	Ball	Ball
Fiberglass	FRP**	Fiberglass	Nylon composite	G-10 fiberglass
\$19.50	\$356	NA	\$479	\$289.99
\$190	\$199.99	NA	\$320	\$189
2/96	10/96	10/97	7/96	10/97

SETUP TIPS

FRONT

- Shock fluid—90WT Trinity silicone in each front.
- Supplemental shock limiters: install one on each shock shaft (inside the shock body) to limit down-travel.
- Springs—stock black.
- Spring pre-load spacers—one thin clip-on spacer on the left shock; none on the right.
- Shock mounting—lower hole on shock tower and inside hole on suspension arms.
- Caster—mount the upper wishbones in the center hole on the upper bulkhead plate (4 degrees negative caster).
- Camber—1.5 degrees negative.
- Toe angle—zero (9mm gap between each ball end on the steering links).
- Steering link—mounted in the upper outside hole on the front axle carriers for more aggressive steering.
- Ride height—4mm.
- Down-travel limiters—not used.

REAR

- Shock fluid—90WT Trinity silicone.
- Supplemental shock limiters—install one on each shock shaft.
- Springs—stock black.
- Spring pre-load—one medium and one thin pre-load spacer on the left shock and one thin pre-load spacer on the right.
- Special tuning—to get the ride height even on both ends of the car, leave a 1.5mm gap between the bottom of the ball end and the surface of the shock cap when you thread the blue ball ends onto the shock caps.
- Shock mounting—lower inside hole on the shock tower and inner hole on the suspension arms.
- Caster/anti-squat—mount the upper wishbones in the rear holes on the upper bulkhead plate (4 degrees of anti-squat).
- Camber—zero.
- Toe angle—1.5 degrees on each wheel (1cm gap between each ball end on the toe links).
- Ride height—4mm.
- Down-travel limiters—not used.

THINGS YOU'LL NEED

- 2-channel AM or FM radio system with receiver and 1 servo.
- ESC.
- 6-cell battery pack.
- Motor.
- Battery charger.
- Lexan body and paint.
- CA glue.
- Liquid thread-lock.
- Associated* Stealth diff lube and black grease are highly recommended.

FACTORY OPTIONS

- Bearing kit.
- Graphite upper chassis plate.
- Graphite lower chassis plate.
- Graphite shock towers.
- Graphite bulkhead plates (front and rear).
- Graphite upper and lower suspension arms.
- Graphite saddle-pack chassis plate.
- Universal shaft swingshafts.

(No part nos. were available at press time.)

David Jun mulls over his final setup for the Sedan A-Mains. Jun was at the track early on Sunday morning to make sure his Tamiya touring car was ready.



The Stock Sedan A-Mains saw some great racing. TO Rudy Rodriguez had a DNS in the first run, so the Mains came down to a battle between David Franklin, Bill Hager and Jared Scott.



ROAR ON-ROAD Nationals

by Rick
Eyrich



*New cars and new
champs hit the track
in Florida*

The 1/10-scale Modified A-Main drivers take their spots on the drivers' stand. A smooth race program kept the competitors busy—especially those who ran all three classes!

Door-to-door racing like this was common on the sugar-watered asphalt track. The usual R/C car traction compounds and suntan lotions helped most drivers grip the circuit.



PHOTOS BY RICK EYRICH



Joel Johnson shows off the two first-place plaques he earned for his 1/12- and 1/10- scale pan-car victories. Joel used Trinity's Switchblade 10 and new Switchblade 12 cars.



IT WAS HOT; very hot; stinkin' hot; really hot! But summer in southern Florida tends to be that way—right? Of course, the local racers and all who ran in the '97 ROAR Electric On-Roads at the Southwestern Florida RC Raceway expected a hot time both on and off the track!

On the "cool" side, much to the delight of the 160-plus 1/12-scale, 1/10-scale and 4WD sedan competitors, the rain gods didn't dump on the Naples, FL, location. The large field required a full schedule of runs, and many didn't know their fate until the qualifiers had been completed on Sunday morning. Here's how they fared!



Above: there was a large field of touring-class 4WD vehicles—Schumacher, Losi and Tamiya cars. All handled the track well. Left: on-track stunts like this one rarely led to DNFs, but those who tried to overdrive the corner at the end of the back straightaway, might "leave the auditorium," so to speak!



A-Main 1/10-scale Modified winners.



A-Main 1/12-scale Modified winners.



A-Main Stock 1/12-scale On-Road winners.



A-Main Stock Sedan Winners.



A-Main Modified Sedan winners.

QUALIFYING

1/12-scale

• **Stock.** Mike McMahon steered his Woods Typhoon pan car to the TQ spot. The New York state driver was closely followed by Jared Scott, Vicky Carrubba and Sean Cooper.

• **Modified.** Multi-champion Joel Johnson and his smoking Trinity Revolver took the pole, Associated's on-road world champion, Mike Swauger, claimed second, and Florida's own Paul Wynn was third overall.

1/10-scale

• **Stock.** A familiar driver from the 1/12-scale ranks—Jared Scott—also led the pack in 1/10-scale stock. He led the local pack of Joe Barbera, Sean Cooper and 1/12-scale TQ'er McMahon.

• **Modified.** Joel Johnson was again the point person, but Swauger, Wynn, Jon Orr and Barry Baker were snapping at his heels.

4WD Sedans

• **Stock.** Touring-car TQ honors went to California's Rudy Rodriguez, who was closely pursued by David Franklin, pan-car driver Scott and Niki Kwong.

• **Modified.** Baker and his Yokomo YR-4 M2 paced the sedans, Johnson's Losi Street Weapon was second, and David

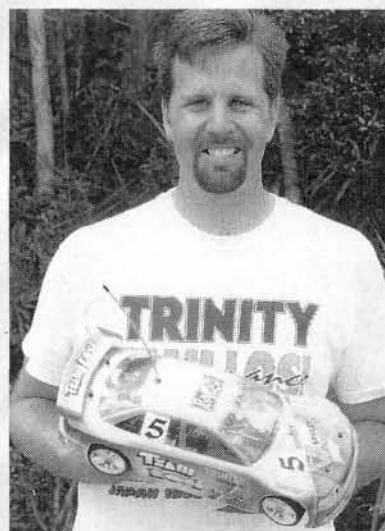
Losi's Armament Activation

To the surprise of many, the '97 Nationals turned out to be the major league debut of Losi's new XX-4 Street Weapon 4WD sedan car. Jack Johnson and Joel Johnson, Ron Rossetti, Mike Blackstock, Brandon McNally and Tyree Phillips all ran it, and Jack and Joel and Rossetti made the A-Main Mod finals.

Jack Johnson and Rossetti ran their XX-4 concept cars while the rest used preproduction units. To get an idea of how good these new on-road cars are, consider this: after months of test sessions, local race meets and just normal run time, Johnson's car didn't need any work. At the ROAR Nats, the Florida temperatures required a heavier shock oil, but that was his only change. The Weapon's basic setup worked well on all the surfaces and track layouts it has seen so far, so Jack had little need to alter it before its first production run, except to add bumpers and body posts.

Overall, the Street Weapon's entrance in national competition proved that it will be quite popular in touring-car racing circles.

Jack Johnson with his Street Weapon before the A-Main action. He qualified fifth for the three-segment Modified Sedan final.



Jun's Tamiya TA03F-Pro rounded out the top three.

MAINS TIMES THREE

The triple A-Main format began bright and early on Sunday for all six classes. The 1/12-scale, 1/10-scale and sedan lower Mains were held between the A-Mains, so each division got a break between heats.

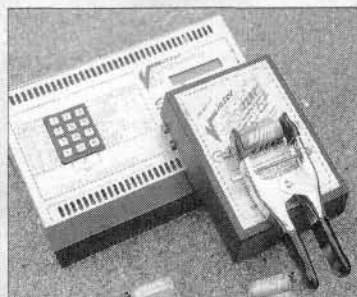
Stock 1/12-scale

• **A1.** TQ winner Mike McMahon started slowly, while the number five starter, Tony Carrigg, took the point. Mike Spehn was second, while Scott dived with McMahon over fourth. Carrigg won the first Main with 26 laps. Spehn, Scott and McMahon followed in second through fourth.

NEWS FLASH

Mainly because of the introduction of the Sanyo 2000 sub-C cell, ROAR has proposed that its heat/main races be lengthened to 5 minutes! I decided to conduct a little poll of racers, officials and other hangers-on about the cells and the lengthening of the races. I give no names; you know who you are!

Believe it or not, some folks ran one pack of 2000s during the entire weekend! Zapping the cells before running was the hot way to go, but many racers kept their discharged 2000s on ice to protect them. Run time wasn't a problem for the 1/10-scale pan cars and sedan cars, but the 1/12-scale



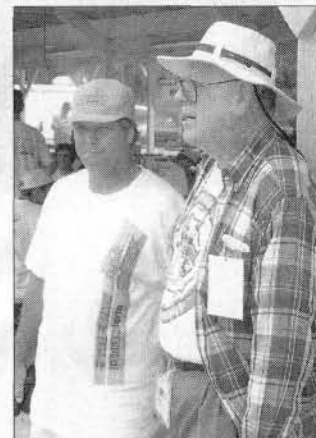
Battery zappers like this Victor unit are used by many Sanyo 2000 cell users. The new Sanyo sub-Cs can be enhanced by using a zapper, but many racers rest the cells in a fridge overnight before they reuse them.

Mod drivers still had to monitor their gears closely to make 8 minutes.

With the Sanyos, very few "dud" batches have been noted, and they usually stabilized within four to six runs—tops. Most of those polled thought the 5-minute race was doable, but some worried about the strain it would place on today's hyper stock motors and their ability to last for 300 seconds!

Overall, most believe the 2000s are tougher and more reliable and make for a more level playing field in electric racing. Who knows? By the time you read this, 5-minute races may be coming to a ROAR track near you!

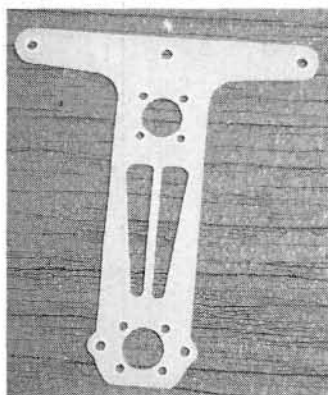
SANYO CELL SURVEY!



ROAR president Phil Hurd (right) has proposed a change to 5-minute races. The performance and reliability of the Sanyos greatly influenced this proposal, but the decision will depend on the ROAR members' reactions.

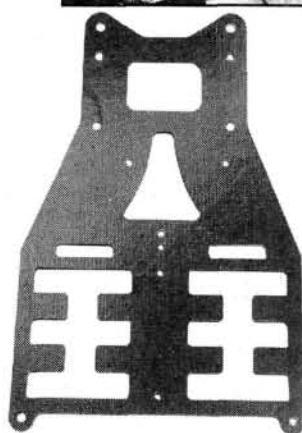
ROAR ON-ROAD NATIONALS

New in the Pits



■ Composite Craft*

Chassis/T-plate for the Associated RC12 and rear axle unit. The T-plate and chassis are slotted to reduce weight.



The huge, roofed pits helped keep the racers cool, but the sun was intense throughout the weekend.



■ Factory Works*

Lexan rear wing/spoiler. These sharp-looking rear deck wings will fit most touring-class bodies.

• A2. Twenty-seven laps were required to win, and McMahon and Scott were up to the challenge. Carrigg slipped to fifth and was beat out of fourth by T.J. Bradley at the line. The buzzer saw McMahon, Scott and Sean Cooper in the top three spots.

• A3. McMahon, Scott and Carrigg broke away at the start. Carrubba made it a foursome for the bulk of the 8 minutes, but the top three remained the same until the finish. McMahon's second and third heat wins clinched the class victory;

Scott locked second; and Carrigg completed the top three.

Modified 1/12-scale

• A1. Within the first two laps of the first run, Trinity's Johnson was way out in front. At the halfway mark, he was lapping mid-pack runners, and his win looked

Winners

SEDAN STOCK

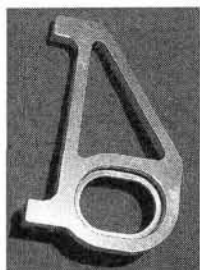
Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction Additive	Pinion/Spur
1	6	David Franklin	Schumacher	Handout	Sanyo	Tekin	JR	HPI	Yokomo	NA	26/83
2	2	Bill Hagen	Yokomo	Handout	Integy	Novak	Futaba	Yokomo	Eagle	Traction Action	30/72
3	3	Jared Scott	Schumacher	Handout	Xipp	LRP	Airtronics	HPI	Pro-Line	NA	26/86
4	1	Rudy Rodriguez	Top	Handout	Integy	Novak	Airtronics	Yokomo	Pro-Line	Traction Action	28/72
5	7	Arthur Tsui	Yokomo	Matrix	Integy	Novak	Futaba	Yokomo	Eagle	NA	40/100
6	8	Joe Barbera	Schumacher	Handout	Xipp	Novak	Airtronics	NA	Schumacher	NA	27/86
7	5	Tony Padilla	Schumacher	Baird	Xipp	Novak	Airtronics	HPI	Schumacher	NA	28/83
8	10	Joey Lundbergh	HPI	Handout	Integy	Tekin	Futaba	HPI	Eagle	Traction Action	35/104
9	4	Niki Kwong	Yokomo	Matrix	Integy	LRP	KO	Yokomo	Eagle	NA	40/100
10	9	David Hatcher	Tamiya	Handout	Orion	Tekin	Airtronics	HPI	Yokomo	NA	27/63

SEDAN MOD

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction Additive	Pinion/Spur
1	3	David Jun	Tamiya	Peak	Orion	Novak	Futaba	Protoform	Pro-Line	NA	16/48
2	2	Joel Johnson	Losi	Trinity	Trinity	Tekin	Airtronics	HPI	Losi	NA	22/84
3	4	Chris Tosolini	Yokomo	Reedy	Reedy/Orion	LRP	Airtronics	HPI	Pro-Line	NA	30/104
4	7	J.R. Mitch	Schumacher	Trinity	Trinity	Novak	Airtronics	Protoform	Losi/Pro-Line	NA	19/86
5	1	Barry Baker	Yokomo	Maxtec	Orion/Reedy	LRP	Airtronics	HPI	Pro-Line	NA	22/81
6	5	Jack Johnson	Losi	Trinity	Trinity	Novak	JR	HPI	Losi	NA	22/84
7	6	Paul Wynn	Schumacher	Reedy	Xipp	LRP	Airtronics	Protoform	Pro-Line	NA	21/86
8	10	Scott Ernst	NA	NA	NA	NA	NA	NA	NA	NA	NA
9	8	Ron Rossetti	Losi	Trinity	Trinity	Novak	Futaba	HPI	Losi	NA	24/84
10	9	Rob Michael	Schumacher	Trinity	NA	LRP	Futaba	Protoform	Take-off	NA	19/86

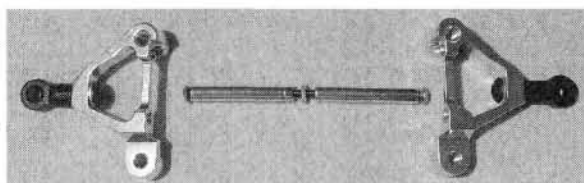
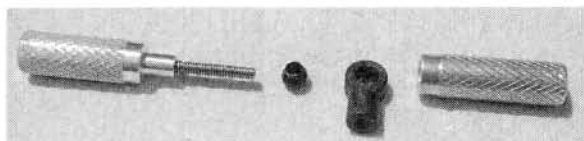
1/10-SCALE STOCK

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction Additive	Pinion/Spur
1	4	Mike McMahon	Woods	Stock	New Wave	Novak	KO	Protoform	Jaco/Jaco	Ground Effects	28/116
2	8	Vicky Carrubba	Associated	Handout	Power Push	Novak	Airtronics	Protoform	TRC	Paragon	27/115
3	1	Jared Scott	Associated	Handout	Xipp	LRP	Airtronics	Protoform	Jaco	NA	27/116
4	6	Tom Esposito	Trinity	Handout	Trinity	Tekin	JR	Protoform	TRC	Paragon	28/120
5	3	Sean Cooper	Associated	Reedy	Pro Match	LRP	Airtronics	Parma/PSE	Jaco	Suntan lotion	28/112
6	9	Jeff Flagg	Associated	Stock	World Class	LRP	Futaba	Parma/PSE	Jaco	Crusher	28/115
7	2	Joe Barbera	Associated	Handout	Blaster	LRP	Airtronics	Protoform	Jaco	NA	27/115
8	7	Nick Tomlinson	Associated	Handout	Xipp	Tekin	Futaba	Parma/PSE	Jaco	NA	27/112
9	5	Tony Padilla	Associated	Baird	Xipp	Novak	Airtronics	Protoform	TRC	NA	27/115
10	10	Joe Conte	Associated	Handout	Powertron	Tekin	KO	NA	TRC	NA	NA



■ Raceway Mfg.*

Aluminum front brace and A-arm setup (bottom). Looks great and works great! Raceway also showed us a new pivot-ball tool (center), several 10L shock mounts to suit any track and a new left side axle brace/upright for Associated pan cars (left).



certain. But it wasn't to be; his car's ESC smoked itself and left him with a DNF. This made the final minutes exciting. Jacob Pritchard led until his car got stuck on a pipe. With 28 laps apiece, Mike Blackstock, Josh Cyrul, Paul Wynn and Mike Swauger finished first through fourth separated by only four ticks of the clock.

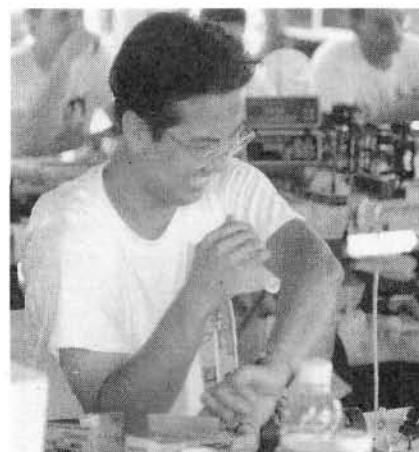
Blackstock, Orr and Wynn. Johnson collected the overall with two firsts; Blackstock was second, and Cyrul was third.

Stock 1/10-scale

- A1. 1/12-scale racers Cooper and
- (Continued on page 194)

• A2. Johnson, Blackstock and Cyrul all recorded 29 circuits, but Johnson won. Blackstock was second, Cyrul passed Wynn for third, and Swauger lost a wheel so managed only 10 laps.

• A3. At the buzzer, Johnson once again took the lead, but Wynn, Blackstock and Swauger weren't far behind. For almost 6 minutes, Wynn and Blackstock dived over second, but this allowed Johnson to pull away and Jon Orr to catch up. With less than a minute left, Wynn's batteries (and those of some others) started to dump, so that left Johnson,



David Jun's winning Tamiya 4WD sedan surprised many folks. His victory showed that the TA03 FP car can lead the touring-class vehicles.



1/10-SCALE MOD

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction Additive	Pinion/Spur
1	1	Joel Johnson	Trinity	Trinity	Trinity	M.Troniks	Airtronics	Protoform	Jaco	Zip Grip	24/120
2	2	Mike Swauger	Associated	Reedy	Reedy	LRP	Airtronics	Andy's	Jaco	Paragon	20/116
3	6	Josh Cyrul	Associated	Reedy	Reedy	LRP	Futaba	Protoform	Jaco	Paragon	23/120
4	3	Paul Wynn	Associated	Reedy	Xipp	LRP	Airtronics	Parma	Jaco	Suntan lotion	22/120
5	4	Jon Orr	Associated	Reedy	Reedy	Novak	Airtronics	Protoform	Jaco	Paragon	22/116
6	9	Edwin McTureous	Associated	Reedy	Reedy/Orion	LRP	Airtronics	Parma	Jaco	Suntan lotion	22/120
7	8	Walter Henderson	Associated	Reedy	Stage III	Novak	Airtronics	Protoform	Jaco	Paragon	22/115
8	7	Dave Vera	Associated	Reedy	Perfect Match	LRP	Airtronics	Parma/PSE	Jaco	Suntan lotion	23/120
9	5	Barry Baker	Yokomo	Maxtec	Orion/Reedy	LRP	Airtronics	Andy's	Jaco	Paragon	25/116
10	10	Mike Blackstock	Trinity	Trinity	Trinity	Tekin	JR	Protoform	Jaco	Trinity	23/120

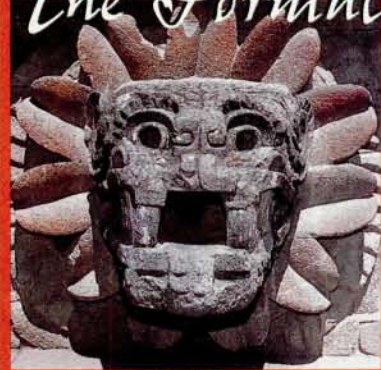
1/12-SCALE STOCK

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction Additive	Pinion/Spur
1	1	Mike McMahon	Woods	Handout	New Wave	Novak	KO	Protoform	Jaco	Ground Effects	25/98
2	2	Jared Scott	Associated	Handout	Xipp	LRP	Airtronics	Protoform	Jaco	NA	25/100
3	5	Tony Carrig	Associated	Reedy	B&T Cells	LRP	Futaba	Associated	Jaco	Suntan lotion	NA
4	6	Mike Spehn	Associated	Reedy	Orion	Novak	Airtronics	Parma/PSE	PSE	Superior	27/115
5	7	T.J. Bradley	CRC	Handout	Cyprist	LRP	Futaba	Protoform	Jaco/Jaco	CRC	28/104
6	3	Vicky Carrubba	Associated	Handout	Power Push	Novak	Airtronics	Protoform	TRC/TRC	Paragon	28/95
7	4	Sean Cooper	Associated	Reedy	Pro Match	LRP	Airtronics	Associated	Jaco	Suntan lotion	29/96
8	8	Joe Conte	Associated	Handout	Powertron	LRP	KO	NA	TRC	NA	NA
9	10	Rod Bustos	Associated	Handout	Sanyo	LRP	KO	Protoform	TRC	Suntan lotion	26/98
10	9	Ritch Grubb	Associated	Handout	Powertron	LRP	Futaba	Hot Bodies	TRC	Suntan lotion	NA

1/12-SCALE MOD

Fin.	Qual.	Name	Chassis	Motor	Battery	ESC	Radio	Body	Tires (F/R)	Traction Additive	Pinion/Spur
1	1	Joel Johnson	Trinity	Trinity	Trinity	M.Troniks	Airtronics	Protoform	Jaco	Zip Grip	25/105
2	7	Mike Blackstock	Trinity	Trinity	Trinity	Tekin	JR	Protoform	Jaco	Trinity	27/105
3	5	Josh Cyrul	Associated	Reedy	Reedy/Orion	LRP	Futaba	Protoform	Jaco	Paragon	25/104
4	3	Paul Wynn	Associated	Reedy	Xipp	LRP	Airtronics	Protoform	Jaco	Suntan lotion	24/100
5	2	Mike Swauger	Associated	Reedy	Reedy	LRP	Airtronics	Andy's	Jaco	Paragon	23/100
6	4	Jon Orr	Associated	Reedy	Reedy/Orion	Novak	Airtronics	Protoform	Jaco	Paragon	24/98
7	8	Jeff Brown	Associated	Fantom	Perfect Match	Novak	JR	Protoform	Jaco	Paragon	24/100
8	10	Walter Henderson	Associated	Reedy	Stage III	Novak	Airtronics	Protoform	Jaco	Paragon	22/100
9	6	Jacob Pritchard	Associated	RaceTech	RaceTech	LRP	Futaba	Protoform	Jaco	Paragon	25/100
10	9	Terry Rott	Associated	East Coast	Powertron	Novak	Futaba	Protoform	TRC	Red Dot	NA

The Formula 1 of R/C goes to Mexico



Story and photos by
George M. Gonzalez

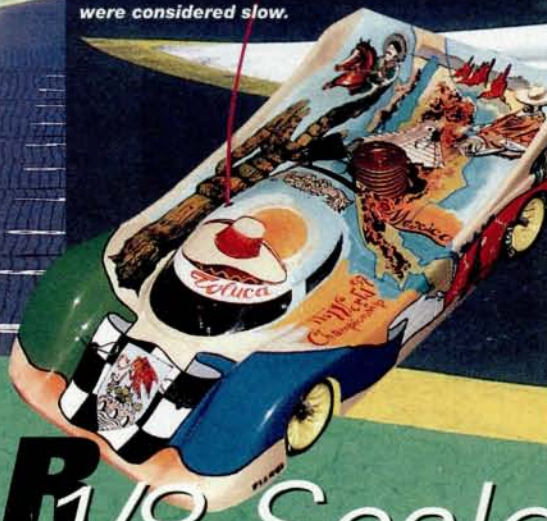


The three winners (left to right): Alberto Picco (second), Lamberto Collari (first) and Adrien Bertin (third).

MANY CONSIDER the IFMAR 1/8-scale Gas On-Road World Championships the Formula 1 of R/C car racing. After attending this year's two-week event and spending time with the drivers, mechanics, team managers, track personnel and spectators, I believe that the comparison is justified and that any auto racing fan would be fascinated with the similarities between 1/8-scale on-road gas racing and full-size racing. IFMAR holds its World



A view of pit row. Cars pulled in and out in seconds. Those who took more than 2 seconds to fill up the tank were considered slow.



11th IFMAR 1/8-Scale WORLD CHAMP



Championships biannually and in a different country each time. The 11th IFMAR Championships were hosted by Mexico's premier racing facility, Club R.C. Pegaso in Toluca, Mexico (México's state



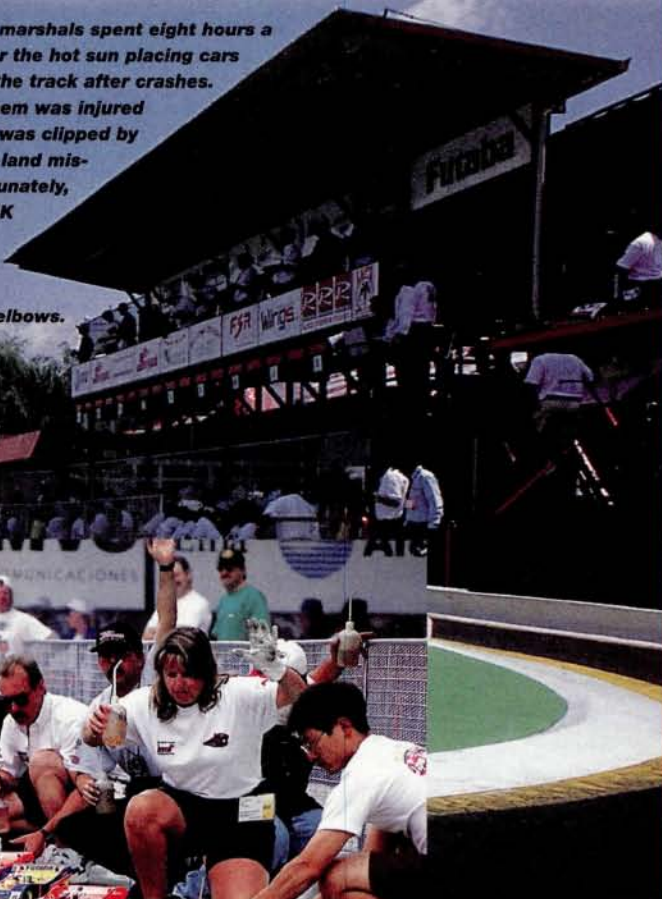
Racing in High Altitudes

By far the biggest obstacle the racers and mechanics had to overcome was not the stress associated with the fierce competition but Mexico's high altitude. Because the facility is so high above sea level, IFMAR agreed to allow the use of 40-percent-nitro-content fuel (typically, a much lower-nitro-content fuel is required). In addition, many of the drivers were not accustomed to the fuel that was available. For these reasons, fuel-related tuning problems abounded.

For the most part, the racers and mechanics had problems keeping their powerplants running consistently. For example, during the grand final top qualifier, after every pit stop, Michael Salven's engine was either too rich or too lean. According to Salven, his engine ran strong during one heat and then very poorly in the next heat. As a result, his team practically had to start from scratch every



The turn marshals spent eight hours a day under the hot sun placing cars back on the track after crashes. One of them was injured when he was clipped by a 70mph land missile. Fortunately, he was OK and sustained only scraped elbows.



Some cars line up for one of the sub-finals.

On-Road CHAMPIONSHIPS



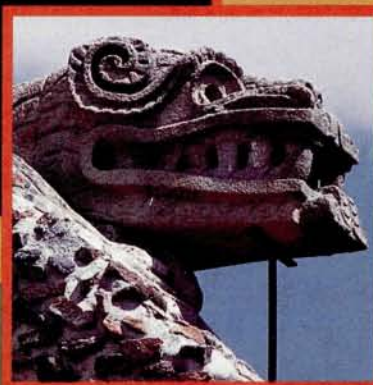
day. Many drivers had similar problems and, as a result, did not make it to the grand final.

A couple of brands of fuel were available at the on-site hobby shop, but some drivers complained that their engines perform better with brands that were not available. I don't believe this was a valid complaint, though; the drivers knew which fuels would be available, and they could have experimented with them beforehand.

Some pilots, however, claimed that along with the inherent altitude and fuel problems, the weather and varying track conditions affected lap times. What it all came down to was that the drivers and mechanics had to pay close attention to tuned pipe, glow-plug choice, clutch setup, tire-compound choices and tire diameter to race competitively. Hey, racing is all about overcoming adverse conditions, and no one can argue that these racers didn't have their hands full.



capital), and were graciously sponsored by Team Serpent, Full Speed Racing (FSR) and NovaRossi. Everyone agreed that the Club Pegaso facility set new standards in professionalism and will no doubt serve as a benchmark for all future world-championship-level racing venues.



THE STARS—THE CARS
R/C car manufacturers such as Serpent, Picco, BMT and Mugen were the major players;

however, FSR and Colt also made their presence known by sponsoring several drivers who were gunning for R/C stardom.

One hundred and forty-three racers representing 20 countries attended, but only one team would emerge victorious.



IFMAR ON-ROAD WORLD CHAMPIONSHIPS

Defending world champion Lamberto Collari (Team Serpent/Italy) was determined to extend his winning streak to five consecutive titles. Michael Salven (Team Serpent/Germany), Alberto Picco (Team Picco/Italy), Fabio Domanin (Team Serpent/Italy) and a host of others, however, were also competing, so Collari knew right from the start that this would be no easy battle.

Eighth-scale gas on-road cars are close to the ground and use GTP/WSC-style open- or closed-cockpit bodies. They feature fully

independent suspensions, 3.5cc (.21ci) powerplants, 2-speed trannies and natural-rubber foam tires. These cars also offer a host of suspension-adjustment possibilities that would make Michael Schumacher's pit crew envious. Because of speeds approaching 70mph, lightning-fast pit stops and a 60-minute grand final, the spills and chills were abundant.



Above: this car won in the *Most Authentic* category. It's owned by Chumpol Phaijittatta.



Left: The *Concours de Elegance*—lots of beautiful cars; a colorful sight indeed.

Right: Lamberto Collari's winning Serpent Vector just after the 60-minute grand final. Quick pit stops kept Collari in front during most of the action.



Michael Baruzzi's Serpent sits on its lid and the front tire from Fabio Domanin's Vector lays on the track after a full speed collision during the start of the 60-minute grand final.



A Gallant Effort by the U.S. Drivers

So how did the U.S. drivers fare? The U.S. was represented by over 40 drivers—more than from any other country and more than three times as many drivers as the next largest team had. Unfortunately, not a single U.S. pilot made it to the grand final. Art Carbonell (Serpent), Frank Calandra (FSR), Chris Tosolini (BMT), Mike Swauger (Picco) and Mike Blackstock (FSR) were among the most well-known U.S. drivers present, so I'll pass along a quick report card on each of them.

Calandra and Blackstock had to wait for their new prototype cars to be completed before they were able to compete. FSR company owners (and brothers) James and Francis Choy worked frantically day and night to prepare the cars for battle. By the time Calandra and Blackstock finally got their hands on a car, the first round of qualifying was well under way. This meant the drivers had to practice and get their cars dialed in during the first few rounds of qualifying.

In spite of this, Calandra was the most successful U.S. driver at the event. He was the 20th qualifier and managed to make his way through a couple of the sub-finals to claim a respectable 28th-place finish. Some may not find this very impressive, but let me tell you, my friends, I consider any driver who can make it to the top 50 at a world championship incredibly talented!

Blackstock, on the other hand, was unable to break 35 laps during qualifying and never progressed through the finals.



Car Action in Mexico While I was taking a break just outside the Club Pegaso facility, I was approached by a gentleman by the name of Ricardo Celis who said he was Mexico's biggest R/C Car Action fan. He told me about the R/C racing scene in Mexico, and that *R/C Car Action* is the number one R/C magazine in Mexico.

I ran into Ricardo again on Saturday, the day of the grand final. This time, however, he brought along the entire R/C Car Action fan club and all their R/C cars (many of them were even wearing R/C Car Action T-shirts). These folks were the nicest people I've ever had the pleasure of meeting, and they were diehard R/C racers to boot (check out their track, pictured at right, which is in Ricardo's back yard). It's a good thing that I was to return home the following day, or I would have probably fallen in love with Claudia!

Here are Mexico's biggest R/C Car Action fans and their cars. Back row (left to right): Ricardo Celis, Francisco Alcazar Andrade, Rodolfo Leon, Fabio Wedrano Gargiulo. **Front row:** Carlos Esnaurizae Q., Cesar Leon M., Musmett Garcia V., Andrea Leon G. (little girl), Gerado D. Carstensen, Bibicho Jose Romero and Claudia Perezza.



As a result, he ended up in 48th place. Nevertheless, Blackstock is a talented 1/12- and 1/10-scale electric on-road racer and should be commended for his efforts at the 1/18-Scale World Championships.

Team Picco driver and 1/10-scale electric world champ Mike Swauger and his mentor/mechanic, Ron Paris, were plagued with problems that

started at the Mexican customs office and ended at the tech table when Swauger was disqualified because his car did not meet the size requirements. Things got a little ugly when the decision was made to disqualify Swauger. Paris argued that the car was tweaked in a crash, and as a result, it did not fit on the measuring board (according to several witnesses, the car was less than 1mm too wide in the front end only). Unfortunately, the decision was final. Swauger ended up qualifying 31st and finished in 52nd place.

I could tell BMT/NovaRossi driver Chris Tosolini had fun in Mexico and enjoyed competing at Club Pegaso. He arrived with an arsenal of OPS engines, but he and his team members made a midstream switch to NovaRossi because of the absence of factory support from OPS. After the switch, he had to become accustomed to his new engine's powerband, and this meant he had to change his driving style and his car setup. Overall, Tosolini qualified 19th, progressed through a couple of sub-finals before he was aced out of contention and ended up in 36th place.

Carbonell had his share of fuel-related tuning problems. As a result, he managed to progress through only one of the sub-finals before being knocked out of the running. He finished 45th. After the race was over for him, he spent most of his time helping other drivers and cheering on the rest of his team members, and he received a well-deserved standing ovation at the awards ceremony.



Associate editor George M. Gonzalez (left) and track owner Luis Garcia Blake. Those who attended the race made just as many friends as they did memories.



Club R.C. Pegaso

Facility owner/founder Luis Garcia Blake and a group of 11 radio control modelers created Club R.C. Pegaso in 1989. Since then, the club has grown to over 100 members, and the facility now occupies over 62 acres of land that is used primarily for radio control planes and cars. Under the direction of Mr. Blake, the club has built what many consider the world's finest R/C racing facility.

The car track measures 295 meters in length and was designed for high-speed racing. Three-dimensional sculptured concrete track barriers mark off the inside track boundaries and the pit area. A rubber canvas fence lines the perimeter of the track, while double rows of cloth fencing wrap around the high-speed sweeper. In the event of a crash, the cloth fencing absorbs the impact, usually with little or no damage to a car.

The timing and scoring area occupies most of the second floor of a large building at the right end of the track. A huge picture window gives the timekeepers an unobstructed view. Computers, backup computers and backup backup computers ensure that a computer glitch or AMB problem won't delay a race. Every night (and when it rains), the entire track is covered with dozens of huge tarps. They're so heavy that it takes a crew of almost 30 workers to lay them out.

The pit lane is recessed several feet below the track to make it easier for the mechanics to work on their teammates' cars (refuel, etc.). A computer monitor is next to every pit space, so all the crews have complete information on the race at hand.

Everyone at the race was issued an identification pass. The appropriate pass was necessary to get into the work area, the pits and other restricted areas. There were security people all over the track to make sure things were done properly.

The drivers' stand and the mechanics' pit area were designed to keep the program moving right along. In a fenced-in "frequency control" area, racers picked up their transmitters, and pit men obtained the transponders. A flight of stairs on the right leads to drivers' stand, while their pit crews enter the pit area below them, also from the right. The drivers' stand is very high and provides an excellent view of the track. When a

race is over, the drivers go down a flight of stairs on the left to hand in their transmitters, while the pit people also move out from the left to take the cars to the technical inspection area.

Thirty or so workbenches near the pit area are typically used as the work area for club races. For the world championships, however, a large canopy was mounted above the club's tennis courts. Tables were set up to create work areas where the 150 racers and their mechanics could work on the cars in comfort. Naturally, AC power was available.

The track also provides all the facilities necessary to get cars ready for each event. A long car-wash area with individual sinks and wash areas provides car cleaning spaces for six racers. Each work area has its own sink, a spray gun that can be filled with solvent, running water and compressed air for drying the cars.

Separate buildings are provided for engine break-in and tire truing. The tire-truing building has six stalls. Each is surrounded on three sides and has enough space for a tire truing machine, a battery and compressed air to clean things up afterward. There is also a series of locker areas where racers can leave their race equipment when the day's racing is done—a miniature "Gasoline Alley."

The track also has an on-site hobby shop, a restaurant, a snack bar, a gift shop, an ambulance/first-aid station, an information center and a dozen or so grandstands for spectators. The track was meticulously maintained. At the end of each day, a crew could be seen out on the track vacuuming and scrubbing. When the cleaning was completed, the track was covered with the tarps.

I don't think a finer R/C racing facility has ever been built. I know that has been said before, but Mr. Blake and Club R.C. Pegaso have set a whole new standard for R/C car racing. The track, the timing and scoring, the turn marshals, the security guards, the catering, the race control and administration, the facilities and the people who ran the event were superb. Mr. Blake and Club R.C. Pegaso have really accomplished something special. —Mike Myers

IFMAR ON-ROAD WORLD CHAMPIONSHIPS

RACING SCHEDULE

The drivers run six qualifying rounds of 10-minute heats with one pit stop for refueling. After that, the top four drivers are guaranteed slots in the grand final; the remaining drivers then race in a series of sub-finals and semifinals, hoping to work their way up to the grand final.

In the 20-minute sub-

finals, three pit stops are required. The top three pilots in each heat move on to the semifinals. The race is over for everyone who does not finish in third place or better. The first leg of the semifinals is the 30-minute 1/4 finals (five pit stops). Again, the top three pilots move on to the next final, while all the others must face the revelation that the party is over.

The 30-minute 1/2 finals (five pit stops) are the final two heats of the event, and they determine which drivers will join the top four qualifiers in the grand final. The top two pilots from each 1/2 final move on to the 60-minute grand final, as do the next two fastest pilots from either of the

1/2 finals. That means six out of the 20 pilots who make it to the 1/2 finals will compete with the top four qualifiers in the grand final.

During the qualifying heats and finals, many controlled practice heats and warmup races gave the pilots the opportunity to practice under real racing conditions and fine-tune their strategies with their mechanics. A 3-minute recorded countdown before each heat let the drivers and mechanics know just how much time was left until the start.

QUALIFYING

The 143 pilots competed in six rounds of grueling qualifying heats. If you do the math, you'll realize that's a lot of racing.

**Assistant race director
Guillermo Alvaro Cervantes
waves the checkered flag to
signify the end of the 60-minute
grand final. Moments before,
Lamberto Collari's car was
gently kissed by the
flag as it stormed
past the finish line.**



Winners

Fin.	Qual.	Name	Country	Chassis	Engine	Pipe
1	3	Lamberto Collari	Italy	Serpent	NovaRossi	-
2	4	Alberto Picco	Italy	Picco	Picco	Picco
3	14	Adrien Bertin	France	Serpent	RB	RB
4	16	Koji Sanada	Japan	Mugen	NovaRossi	Nova Rossi
5	1	Michael Salven	Germany	Serpent	Serpent	OB9
6	5	Rody Roem	Netherlands	Serpent	RB	RB
7	6	Michael Baruzzi	Italy	Serpent	NovaRossi	-
8	17	Kenji Osaka	Japan	Mugen	NovaRossi	NovaRossi
9	2	Fabio Domanin	Italy	Serpent	NovaRossi	NovaRossi
10	7	Alessandro Aspesi	Italy	Picco	Picco	Picco

THE ULTIMATE PIT SP



When you pull up the Team Serpent Network web site you pull into gas racing's ultimate pit space. Browse the on-line version of our 80-page, 200-photo Tech Book—a virtual gas car bible that puts 20 years of tuning know-how at your fingertips. Join the Cyber-Pit, a unique interactive web page where racers from around the world share tech information. Download our exclusive START datalogging software...for free. Or read the latest tuning tips in columns by the current World T.Q., the ROAR Champion, and other experts. TSN—get it dialed up, and get your car dialed in.



Teamwork—The Driver/Mechanic Relationship

To be competitive at this level of racing, the pilot and the mechanic (pit person) must work with each other in perfect harmony. In fact, I compare the driver/mechanic relationship to that of a composer and a musician. A good mechanic must also be a good pilot. In addition, the mechanic must be extremely familiar with his or her teammate's driving style. As one mechanic put it, "I know my driver better than I know my own wife"! Does he need marriage counseling? Perhaps, but his point is well taken.

So what goes on in pit lane during a 60-minute heat? For the most part, a lot of refueling. Most of the drivers took their cars in for refueling after approximately 5 minutes of racing. It was up to the mechanic, however, to determine exactly when the pilot should come in for fuel. A typical fuel stop took less than 3 seconds, so if it was timed correctly, it had little or no effect on the pilot's position.

The only other adjustments that were made during a race were to the engine's high and low needle-valve settings and to the rear wing. In some instances, however, tires were changed as well. To adjust engines for maximum performance, some mechanics relied on temperature guns, some relied on lap times, and some relied on their eyes and ears (gut feeling). The mechanics monitored the cars' handling traits and adjusted the rear wings to increase or decrease rear downforce. Tire changes were made only if absolutely necessary; however, most of the pilots made do with one set of tires. Even though most of the cars were equipped with

quick-change tire mounts, changing tires required a few extra seconds, and in most cases, this was not feasible.

All the suspension settings, such as camber, caster, swaybar stiffness, spring preload, shock absorber down-travel and shock damping, were usually adjusted during practice. In addition, clutch adjustment and tire diameter were determined before the race.



Fuel	Radio	Tires (F/R)
FSR 40 percent	Sanwa	Ellegi
Picco 081	KO	Action
Concept Fuel 40 percent	Sanwa	Ellegi
Byron 40 percent	KO	Fast Tires
NA	Sanwa	Ellegi
Concept Fuel	Sanwa	Arrows
FSR 40 percent	Sanwa	Ellegi
Byron 40 percent	Sanwa	Fast Tires
FSR 40 percent	JR	Arrows
Picco 081	KO	Action

CE IS IN CYBERSPACE



www.serpent.nl

Serpent
EXCITEMENT IN THE FAST LANE

IFMAR ON-ROAD WORLD CHAMPIONSHIPS

With that in mind, I'll skip my usual play-by-play commentary and provide you with only the results.

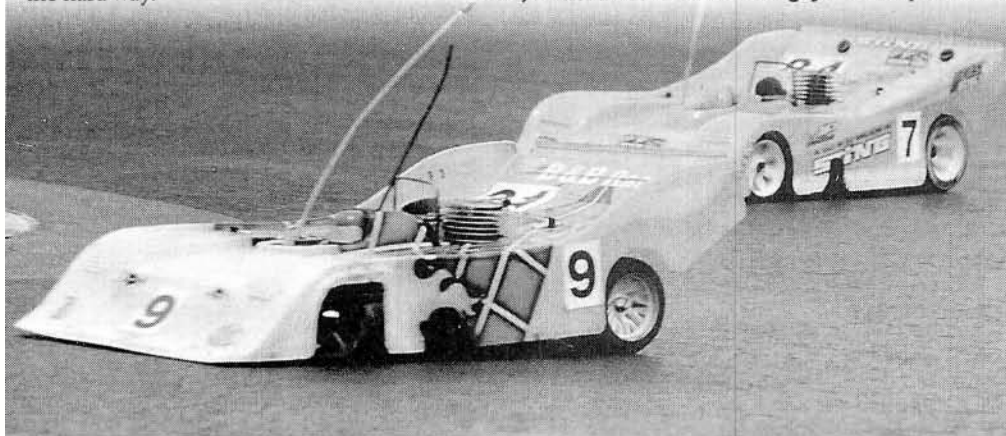
- **After two rounds.** Team Serpent/NovaRossi driver Fabio Domanin (Italy) was the first pilot to break the 36-lap barrier by posting an amazing 37/10:14.70 best time. His teammate, Stefano Colombini (Italy), posted a 36/10:00.73, which was the second fastest time. Another Team Serpent/NovaRossi driver, Michael Baruzzi (Italy), posted a 36/10:00.78 (less than 1/100 second slower than Colombini) to take the third spot, while Team Serpent driver Michael Salven (Germany) claimed fourth with a 36/10:01.80.

- **After four rounds.** Domanin managed to surpass his best time by 2 seconds with a 37/10:12.66 run; however, Salven found the fastest way around the track and posted an amazing 37/10:08.12. This put him in the "untouchable" category and earned him the pole position in the grand final. Domanin's 37-lap run was good enough for second, though. Meanwhile, Team Picco driver Alberto Picco (Italy) posted a 36/9:55.81 best time, which allowed him to claim third. Colombini ended up dropping to fourth, while Baruzzi got bumped to sixth behind defending world champion and Team Serpent driver Lamberto Collari, who qualified fifth.

- **After six rounds.** After the final rounds of qualifying, several teams broke the 37-lap barrier. Salven's best time, however, remained the fastest; this earned him the TQ designation and assured him a prime piece of Mexican real estate on the starting grid. Domanin, refusing to rest on his laurels, posted an amazing 37/10:08.77—a blink of an eye slower than Salven's TQ run—to finish as the second qualifier. Collari joined the elite "37 club" by posting a 37/10:10.19 to claim third. Picco's 37/10:10.67 best time placed him in fourth and assured him a seat in the grand final. Team Serpent driver Roddy Roem (Netherlands), Baruzzi and Colombini all managed to put in 37-lap runs, but they were edged out of the top four, so they would have to qualify for the grand final the hard way.



Above (clockwise from top): ■ Now, this is what I call bench racing! Gee, I wonder which car is faster on the bench. I guess racers will do anything to pass time. ■ Five-time world champion Lamberto Collari works on his car in peace. The pressure was constantly on him during the event. ■ FSR's James Choy works on one of his drivers' prototype cars. This new car is pretty trick! ■ The legendary Arturo Carbonell. You can't possibly have a discussion about on-road gas racing without Carbonell's name coming up. ■ Top qualifier Michael Salven rebuilds his shocks after one of the sub-finals. ■ Despite all of Mike Swauger's troubles, he never lost his cool. This guy is a true professional (he's also a heck of a nice guy).



IFMAR ON-ROAD WORLD CHAMPIONSHIPS

GRAND FINAL

Although the weather was pleasant during most of the event, the Aztec sun gods were especially kind on grand final Saturday. The temperature remained in the low 80s with a cool breeze that refreshed us all, including the hundreds of spectators who seemed to overflow from the bleachers that had been strategically placed around the track's perimeter.

The facility grew quiet as the 2-stroke powerplants rumbled to life and the cars exited pit lane. "Attention pilots; 3 minutes to race time" could be heard as the cars circled the track as drivers tried to warm up their tires and engines before the start. "Two minutes to race time 1 minute to race time." Then, in recent Indy fashion, two cars collided before the race even started. Apparently, Baruzzi's Serpent Vector ended up on its lid right in front of pit lane, and Domanin's Vector plowed right into it at full speed. Baruzzi's car escaped with minimal damage, but Domanin wasn't as lucky. His car lost its entire front suspension, and this foiled his chances of putting in a good run.

Right: the radio impound technicians (left to right): Paolo Salgado Castillo, Monica Monroy Vilchis and Soco Rosas Castillo. Yup, it was a pleasure to turn in your radio after a race.



A car passes through the tech area. That board measures the car's overall width. This is where the race ended for U.S. driver Michael Swauger (not shown) when his car did not fit on that very board.

After the mess had been cleaned up, the race started in grand fashion. Nine cars shot out of the starting grid with TQ Salven leading the way. After a couple of laps, Salven, Collari and Picco formed a freight train and held their positions until the first pit stop. All three drivers pulled in to pit lane almost simultaneously and exited in the same order. Moments later, Collari made a clean pass around Salven and found a ton of open real estate in front of his car. Salven held on to second

Worlds on the Web

To the best of my knowledge, this was first world championship event to have a "live" interactive website on the Internet. It was created with the assistance of Pieter Bervoets (pictured below) from Team Serpent months before the event and featured information on hotels, tours and travel to Mexico. In addition, information on the facility, qualifying and finals, car and engine regulations, the drivers and IFMAR was only a click away.

The moment the first round of qualifying started, the website went live. The AMB track scoring system was linked up to the Web, and the results were posted instantly. Fans could also use the website to follow the progress of a particular driver. A special chat link was available and allowed people to send messages to their favorite drivers and offer words of encouragement. All the messages were then posted on a board so that the drivers could read them.

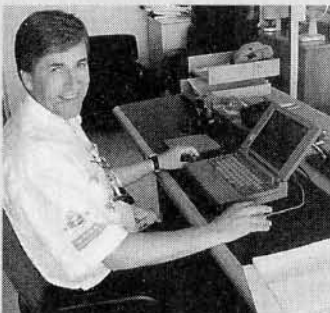


PHOTO BY MIKE MYERS

Several reporters were equipped with digital cameras that allowed photos to be instantly uploaded to the website. The images captured all the fun and excitement of the event, so people thousands of miles away could feel as if they were part of IFMAR history. A few reporters also had the time to post their impressions as the event progressed. Overall, the live website was a great idea, and I hope to see more R/C races live on the Internet.

for a moment until his car caught some air going down the straightway and flipped. At that point, Picco claimed second place, and Salven fell back to third.

From that moment on, it was a battle between Collari and Picco as Salven's car started to slow down. Within minutes, Team Serpent's Adrien Bertin (France) took the third position away from Salven and remained there for the duration of the event. Meanwhile, Picco started to reel in Collari, and it was evident that Picco's car was posting faster lap times than Collari's. For

some reason, however, Collari always made up the difference in lap times in the pits; his pit stops were noticeably faster than Picco's, and these lightning-fast stops kept him in the lead.

Just after the halfway mark, Collari's car became a little loose. This was especially noticeable on the sharp corners, where its rear tires started to drift. Picco's car, on the other hand, was planted on the track and seemed unshakable. Picco made the move on Collari while going through the chicanes, and his pass succeeded. Picco was now in the lead, and within minutes, the margin grew to almost the full length of the straightaway. At this point, many thought the race was over for Collari. Less than 10 minutes remained, and Picco continued to lengthen the distance between his car and Collari's. Could Picco keep up the pace and end Collari's world championship winning streak?

With less than 8 minutes left, the question was answered. For some reason, Picco went one lap more than he should have between fuel stops, and his car started to run out of gas. He managed to make pit

lane without stalling, but the moment the fuel cell was opened, the car stalled and had to be restarted. The car was back in the race within seconds, but by then, Collari had a commanding lead. The agony of defeat was evident as the distraught pit man, Picco's brother, pounded his hands on the asphalt and then clasped them together and prayed that Alberto would be able to make up the lost time.

As it turned out, Collari took advantage of his opponent's misfortune and crossed the line to take the win for the fifth straight time in his racing career. Picco's car crossed the line 3 seconds later (less than a car's length in front of Bertin). Team Mugen's Koji Sanada (Japan) rolled in to claim fourth, while TQ Salven had to settle for fifth. Roem, Baruzzi, Team Mugen's Kenji Osaka (Japan), Domanin and Team Picco's Alessandro Aspesi (Italy) crossed the line shortly after.

FINAL THOUGHTS

The IFMAR 1/8-Scale On-Road World Championships was probably the most exciting R/C racing event that I have ever had the pleasure of covering. That it took place in historic Mexico really added a certain flavor, and I'm certain that all the folks who traveled to the event will always remember their experiences in this wonderful country. We thank our gracious host, Louis Garcia Blake, and the entire staff at Club R.C. Pegaso. They have a first-class operation and know how to run a successful program. We also thank Team Serpent, FSR and NovaRossi for their generous sponsorship; events like these could never become a reality without the help of sponsors. Above all, we congratulate Lamberto Collari for his fantastic performance and all the other grand finalists who worked so hard during the course of the event. ■

HOME PROJECT BUILT

by Kevin Meyer

BECAUSE OF SKYROCKETING real estate prices here in Denver where I live, space for R/C racing is at a premium. Local racing facilities have either been closed down or made smaller. What is an avid R/C'er to do? A new breed of scaled-down vehicles—Terry Plummer's $\frac{1}{16}$ -scale NASCAR—offers one solution. After years of racing $\frac{1}{10}$ -scale models, Terry grew tired of the never-ending "wallet wars" and the "bigger is better" syndrome, so he decided to devise his own, very inexpensive to run, racecars whose small size makes it easy to turn your basement or driveway into a miniature race circuit.



1/16 SCALE

Pint-size Racers

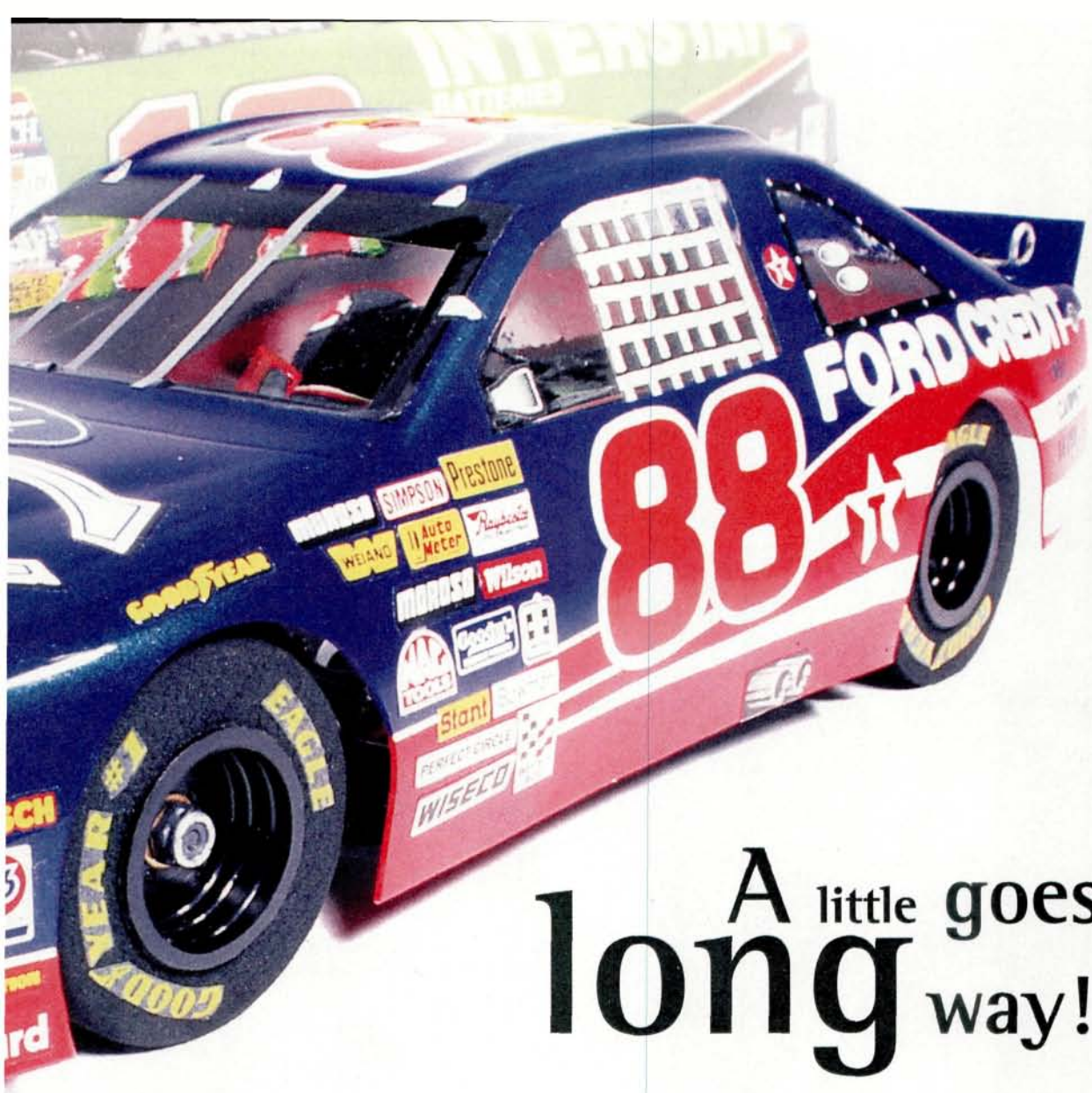


What if I told you that you could buy a car just like this one? Interested? Well, these cars have become so popular that Terry has built several hundred and sold them throughout the United States.

To run the cars, a local club limited to 25 or 30 members—the Radio Actuated Stock Car Auto Racing (RASCAR)—forms every fall and assembles a $\frac{1}{16}$ -scale track. They all race the same spec chassis using the same batteries and motors, but each member races a different NASCAR body and is called by its real-life driver's name.

For example, if you chose to drive the Kodak no. 4 Monte Carlo, you would be referred to as "Sterlin Marlin."

The race program is also a big departure from the usual 4-minute races. Three, 2-minute qualifiers determine the 50-lap enduro mains, followed by another set of three, 2-minute qualifiers and another 50-lap enduro. For more information about the cars and the RASCAR club, contact Terry at American Racing Models, 11347 W. Frost Ave., Littleton, CO 80127.



A little goes a
long way!

NASCAR

Hot Bodies



For the homebuilt body shells for this 1/16-scale racer, Terry carves the basic design out of a block of wood. When he's satisfied with the shape, he makes a mold out of vacuum-formed styrene then fills it with Bondo. Once it hardens, he adds intricate details. It's easy to make changes in the Bondo model; for example, if the body style is revised from one year to the next, the obsolete body

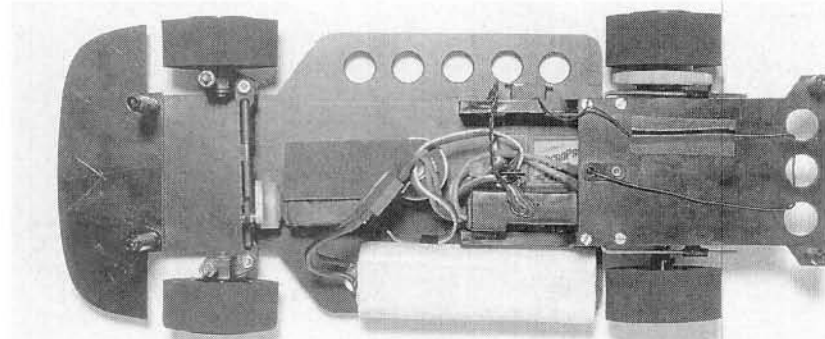
part is removed and replaced with the current one.

With the detailing complete, a special frame attached to an 18x12-inch sheet of 0.040 polycarbonate is heated in the oven until it becomes pliable; then it's removed and molded over the Bondo model. After the polycarbonate has cooled and hardened, you have a body shell that's ready to be trimmed, painted and detailed. This particular model has already had two facelifts to replicate the '97 Thunderbird you see here.

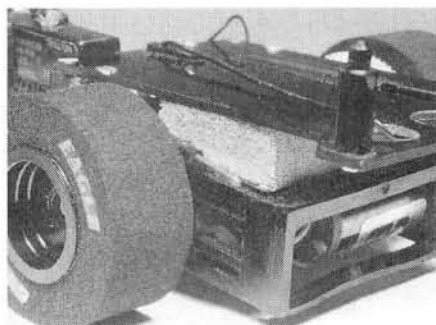


The rear motor pod is injection-molded nylon and can be set up for left- or right-hand drive. The trailing arms can be lengthened or shortened to tweak handling and traction. The small Kyosho motor used to power this racer is more than adequate to spin those foam tires. Drive axle is made up of a ball diff containing a standard-pitch Kimbrough spur gear and Associated diff rings. Ball thrust washers smooth out diff adjustment.

The cars' cleanly crafted fiberglass chassis (dyed black) have a very small parts count, so they're easy and cheap to maintain and repair. The main chassis and rear deck are cut out of 1/16-inch-thick G-10 fiberglass. The front suspension consists of Parma* 1/12-scale steering blocks and axles, and the top of the kingpin is threaded to adjust spring preload. Associated* springs were used on the suspension; this assembly makes spring changes easy. The cars are simple to set up and fine-tune. The all-thread tie rods have



The small, 6-cell stick packs are secured to the chassis with Velcro® strips. This makes removal easy, and the battery can be positioned to improve steering or rear traction.



The small foam pad under the rear deck platform can be moved to either side of the motor pod for tuning and tweaking. Note the small 1/16-inch piano wire used as a swaybar.

TEST GEAR

- Futaba Mag. Jr.
- Futaba S9601 servo
- Tekin* 411P ESC
- Sanyo* 6-cell N-270AA
- Kyosho le Mans DMC20 with ball bearings
- Dynamite* Micro Pro AM receiver

2-56 Du-Bro* swivel ball links. The Futaba* mini-servo used for steering conserves space and weight.

The battery packs are assembled with six, 1.2V, 270mAh cells and Deans* plugs, and they're attached to the chassis with Velcro®-brand fasteners. This makes changing the packs a snap and also allows them to be moved forward or backward for steering or traction gain.

The frame rails and motor pod were injection-molded. The motor pod is symmetrical, so the car can be set up to be right- or left-hand drive. Kyosho's* DMC20 ball-bearing motor supplies power to the ball differential. A Kimbrough* 48-pitch spur gears and Associated diff rings round off the diff assembly.

Terry custom-formed the highly detailed NASCAR bodies out of 0.040 Lexan (see the "Hot Bodies" sidebar); for this project, he replicated Dale Jarrett's no. 88 Quality Care Ford Thunderbird. After he had sprayed on Pactra's* Sprint White,

specifications

DIMENSIONS

Wheelbase6.5 in.
Width4.63 in.
Length12 in.
Height3.25 in.

Chassis—1/16-inch-thick G-10 fiberglass.

Front suspension—Parma 1/12-scale steering blocks and axles, 2-56 Du-Bro brass coupler kingpin, 2-56 Du-Bro swivel ball links with 2-56 all-thread tie rods; Associated springs.

Rear suspension—injection-molded nylon motor pod, 2-56 Du-Bro swivel ball links with 2-56 all-thread trailing arms and 1/16-inch piano-wire rollbar (swaybar).

Motor—Kyosho le Mans DMC20 with ball bearings.

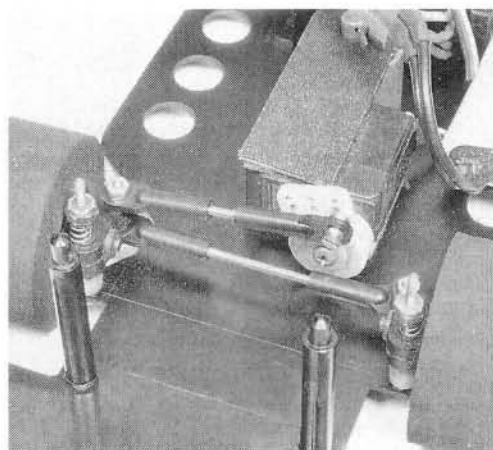
Batteries—6 cells @ 1.2V each, 270mAh.

Transmission—ball-diff assembly on 1/8-inch steel axle with 5-40 threaded end for diff nut; Kimbrough 48-pitch spur gear and 48-pitch, nylon, slot-car pinion.

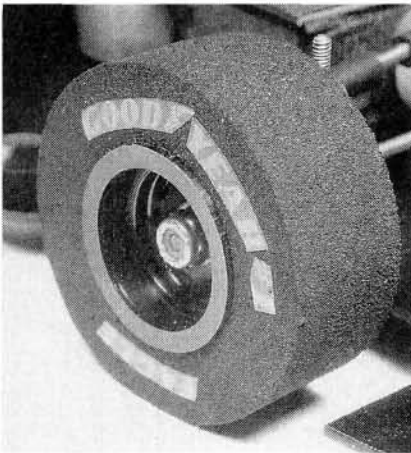
Tires/wheels—foam tires (yellow compound) on injection-molded nylon rims.

Body—custom-formed 1/16-scale Ford Thunderbird (0.040-inch-thick Lexan), Autographics 1/24-scale decals.

Electronics—Futaba Magnum Junior transmitter, Dynamite Mini Pro receiver, Futaba S9601 micro servo, Tekin TSC411P ESC.



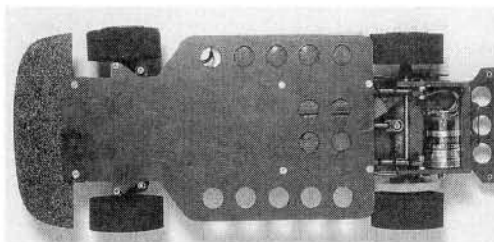
Threaded kingpins and Associated springs make it easy to adjust the front suspension. Steering can be fine-tuned by turning the nut on top. Du-Bro ball ends and "all-thread" make up the tie rods, which are connected to a small Kimbrough servo-saver. Steering is handled by a Futaba S9601 servo; it's light and takes up little room on the chassis. The front bumper is fashioned out of ABS plastic.



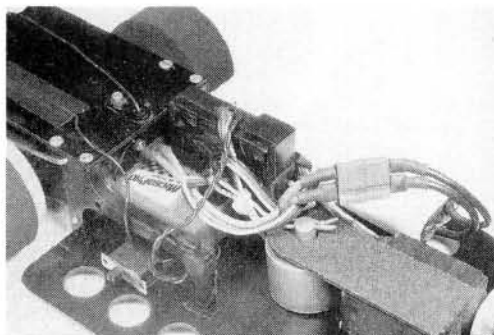
The car rolls on small foam donuts (yellow compound) on injection-molded wheels.

Racing Red and Metallic Blue, he applied Autographics* 1/24-scale decals. Terry also used the STiKA* graphics scanner for the "88" and "Ford Credit" lettering.

I've owned and raced one of these 1/16-scalers for two race seasons now. Although these cars run best on carpet, they also run well on smooth asphalt and concrete. Because of the narrowness of the chassis, you may have to choose



This view shows the underside of the fiberglass chassis. The car has a low parts count that makes it easy and cheap to maintain and repair.



The electronics are strategically placed for balance and handling. The Tekin TSC 411P ESC fits perfectly between the frame rails. The Dynamite Micro Pro AM receiver is a great space and weight saver.

between tight steering and good rear-end traction. When I first raced the car, it lost traction and spun out when exiting turns. To reduce front traction and increase rear traction, I shortened the rear trailing arms on the left and extended them on the right and unloaded (loosened) the front left spring. Camber and caster adjustments aren't possible. To improve cornering, use tire stagger (the left front tire has a smaller diameter than the right front). Run times are about 8 minutes but vary with gear selection. The car's flat-out speed is impressive.

This little model is easy to work on and loads of fun to drive. During the time I raced my car, the only thing I bought was a new set of foam tires; now that's low-budget! Just recently, Terry let it slip that he's working on a new project car, and this one is even smaller! When I get the scoop on his new venture, you will too. Watch for details in a future issue.

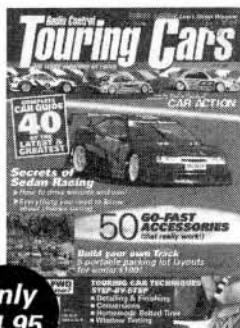
*Addresses are listed alphabetically in the Index of Manufacturers on page 200.

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Don't miss this special issue from the editors of Radio Control Car Action. It contains everything you need to know about parking-lot racing and includes product guides, step-by-step how-to's and the latest tuning tips.

See page 180

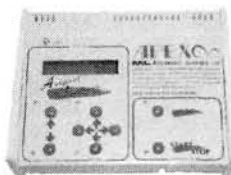
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Make Custom Lettering

Can't find a decal?...Make your own by Kevin Meyer

IF YOU CAN'T go fast, you can at least look good!

Granted, my cars may not be as fast as some at the track, but they hold off the competition and always look great! I hear plenty of positive comments, but some scoff because I spend so much time detailing my bodies only to see them slam-dance with the wall on their first time out.

The fact is, I always have fun with my hobby, and I get a big kick out of coming up with wild paint jobs and graphics. That's where it's at for me! I attended a commercial art school, so graphic art is my forte, but you don't have to be an artist to pull off a cool paint job with custom graphics. All you need are a little creativity, the right materials and a steady hand.

Instead of masking and painting, I prefer to use my own vinyl letters. This is easier than painting the letters on and I get a sharper, cleaner line without the possibility of paint bleed-through. And I don't have 10 tons of paint build-up on the body when it's finished. Vinyl is flexible and very durable, so the graphics usually outlast the body. Another advantage is that because the signage hasn't been painted on, it can be repaired or changed at any time. Here's a step-by-step way to make your own custom lettering—dirt-cheap, too!

FIND A THEME

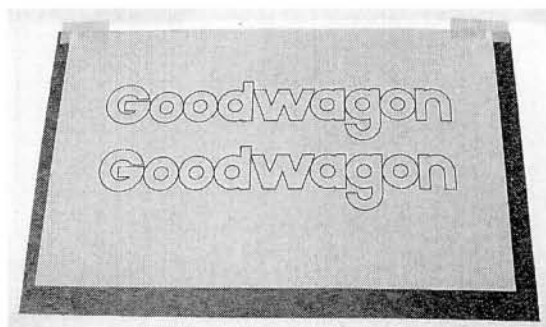
The first step is to come up with a witty theme and then find good reference material—very important if you want authentic-looking graphics. There are many sources of good ideas and reference materials. Commercial products with sponsor logos are everywhere; just look around! Packaging right off your

kitchen shelf—a cornflakes box, for example—can be copied and transferred to your car; and you might use a computer to generate your letters and graphics. I have access to a computer with AUTOCAD, so I used that program for the lettering on my special Goodwagon theme car, which has fictitious sponsor logos. I love the looks it gets when it pulls up to the line.



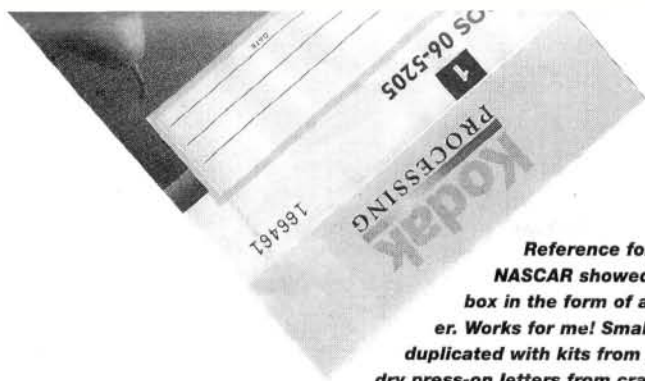
They say imitation is the sincerest form of flattery. My theme car is a knock-off of Earnhardt's #3 Goodwrench Chevy. This one's for you, Dale!

1 *It's fun and easy to make your own custom lettering. Tape a vinyl trim sheet down on your work surface (colored side up). Place a piece of carbon paper over the vinyl (carbon side down). Tape the graphics you intend to transfer over the carbon paper.*



2 *If you don't have a steady enough hand to trace the graphics, use a circular template and a straightedge to help you.*

PHOTOS BY KEVIN MEYER



Reference for this 1/16-scale NASCAR showed up in my mailbox in the form of a Kodak film mailer. Works for me! Smaller letters can be duplicated with kits from Autographics, or use dry press-on letters from craft or art-supply stores.



THINGS YOU'LL NEED

- Good reference material.
- Hobby knife.
- Vinyl trim sheets (Coverite or MonoKote).
- Tracing paper.
- Carbon paper.
- 1/4-inch masking tape.
- Access to a photocopier with enlarging and reducing capability.
- A steady hand.

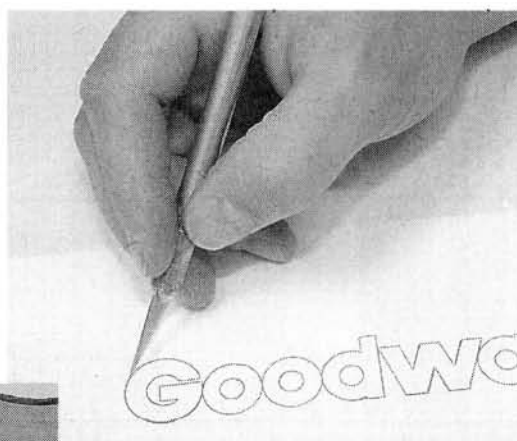
When you've found the material you plan to use—pictures, sponsor logos, lettering, etc.—size it to fit your model's scale. Use a photocopier to enlarge or reduce the material to the size you need.

You'll need tracing paper (also referred to as "vellum") and carbon paper, both of which you can pick up at a craft or art supply store. Lay the tracing paper over

your photocopy and trace the design. Next, you'll need the carbon paper. Tape a sheet of Coverite*, Presto*, or MonoKote* vinyl trim sheet onto your work surface. Put the carbon paper (carbon side down) over the vinyl sheet. Place the tracing of your lettering or design over the carbon paper and go over the lines to transfer the design to the vinyl. Then your letters are ready to be cut out.

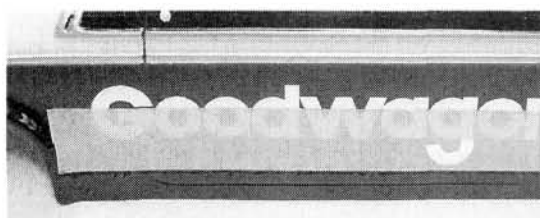
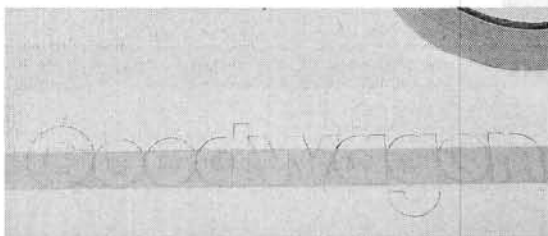


3 The complete tracing is now ready to be cut out. When cutting "enclosed" letters or numbers, cut out the insides first. Patience is the secret here.



4 When cutting around curves, rotate the vinyl as you go to make a smooth, continuous cut and avoid lifting the blade off it.

5 When you've cut out the letters, remove any excess vinyl around the letters. Next, place 1/4-inch strip of masking tape along the bottom of the letters. This will help you transfer them to the body.



6 To align the letters and keep them straight, lay another strip of 1/4-inch masking tape on the side of the body to use as a guide. A couple of shots of Sticker-On will let you float the letters around until they're exactly where you want them. Squeegee out air bubbles and pat off the excess Sticker-On with a paper towel. When the letters are firmly in place, carefully remove the strip of tape.



Parma's '56 Chevy Nomad is the perfect vehicle for my Draggin' Wagon motif. In the end, patience pays off with a one-of-a-kind racer!

HOW TO MAKE CUSTOM LETTERING

SUGGESTIONS FOR SUCCESS

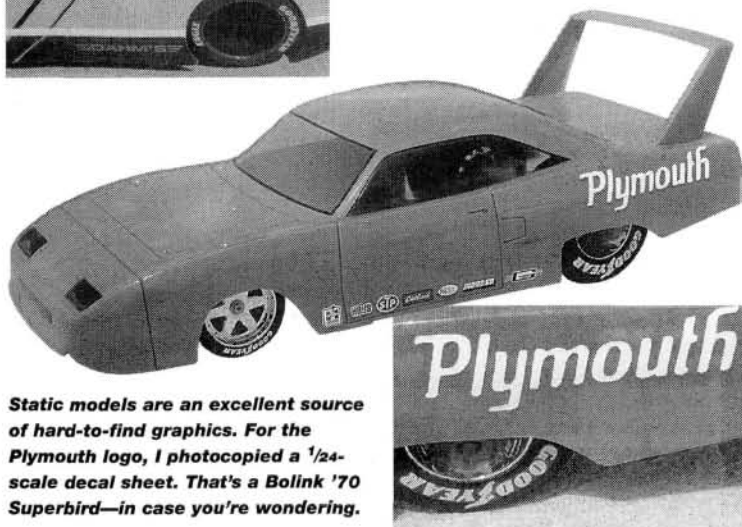
When you cut the letters out, be sure to first cut out the "holes" in the letters or numbers—a, b, e, d and 6, 8, 9, 0, etc. Cut a few of each, then choose the best of the bunch. Cut with long, smooth strokes without lifting the blade off the vinyl. To cut around curves, it's easier to rotate the vinyl than to rotate your knife blade. Most important of all: take your time; don't rush it.

If you're making letters on black vinyl on which your carbon-paper lines would be impossible to see, try this: use the reverse side of your tracing and draw the letter outlines on the backing of the vinyl (the artwork/letters will be backwards). This will make it easier to see the lines when you're ready to cut the letters, etc., out.

Here's a little trick to make it easier to transfer the letters to the body. First trim off any excess vinyl that may be around the letters. Then, to align the letters as you want them, position them, face down, along one edge (sticky side) of a piece of 1/4-inch masking tape. Place another length of 1/4-inch tape on the body where the letters are to go. To apply the letters, use the "float and stick" method. Spray Autographics® Sticker-On over the area where the letters or design will be placed. This will buy you time to float the letters into place before the adhesive starts to stick. When the letters are where you want them, gently dry the area by patting it with a paper towel, and the adhesive will stick.



To create bordered lettering, cut two sets of letters, the "border" set larger than the other. Dahm's Tornado SS SuperTruck shell served as a model for this DieHard project.



Static models are an excellent source of hard-to-find graphics. For the Plymouth logo, I photocopied a 1/24-scale decal sheet. That's a Bolink '70 Superbird—in case you're wondering.

Well, now that you've mastered making your own custom letters, the only boundary is your imagination. You'll be the talk of the track when the gang sees the rare custom graphics on your R/C vehicle. This a fun project; you'll get a sense of

accomplishment when you've finished, and it's great stress therapy! I hope this article will ignite a creative spark so you'll create a concours winner of your own!

*Addresses are listed alphabetically in the Index of Manufacturers on page 200. ■

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K O S E

Our newest Tamiya TA03F hop ups

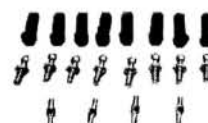
- | | |
|--|---|
| K-1260 hardened outdrives | K-1273 carbon rear shock mount
(with new shock mounting holes) |
| K-1262 carbon chassis | K-1274 aluminum lightweight countershafts
(F and R) |
| K-1263 carbon upper deck | K-1275 adjustable steering turnbuckle set |
| K-1264 super steering set | K-1276 super center shaft one-way set
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| K-1265 adjustable upper arm set (F and R) | K-1277 heavy duty spur gear
(made of steel and aluminum) |
| K-1266 aluminum suspension arm set (F or R) | K-1278 super bulkhead support (F or R)
(protects bulkhead from breaking) |
| K-1267 super aluminum upper arm set (F or R) | K-1279 aluminum motor mount plate |
| K-1269 super aluminum rear hub carrier | K-1280 aluminum pulley set (16T) |
| K-1270 steering gearbox post set
(replaces plastic front steering bulkhead) | |
| K-1271 adjustable belt tensioner | |
| K-1272 carbon front shock mount
(with new shock mounting holes) | |



K-1272



K-1266



K-1265



K-1270



K-1262



K-1263



K-1279

Off-Road Racing Tips

Helpful tips and tricks to get you dialed in at the track by Doug Mertes

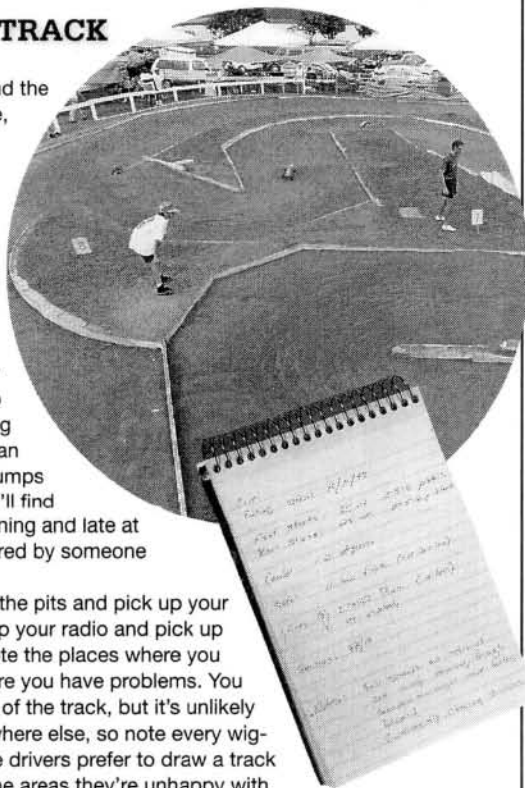
Most racers don't understand that the really fast guys don't get in front because their motors are faster or their batteries are totally nuclear (although their stuff isn't slow, either) but because they pick up $\frac{1}{10}$ second here and $\frac{1}{10}$ there because they know how to adjust their equipment. These drivers have discovered that small changes to the factory-recommended ballpark setup result in major lap-time reductions; these can easily add up to 1 second or so per lap, and that, over a 4-minute race, puts them a full lap or more in front of the folks whose cars are simply well-behaved. How can you get from where you are to where they are? Read on, little buddy, and get ready to get faster!

SCOPING OUT THE TRACK

Start by walking all the way around the track. Squat every once in a while, and figure out the elevation changes from turn to turn. If you aren't allowed on the track because cars are running, get as close to it as you can, and check out the racing line for ruts, bumps, loose dirt and dust, rocks and other potential hazards that you won't be able to see from the drivers' stand. Many quick drivers like to follow that up by driving their cars while standing down at track level so that they can see the cars' reactions to turns, jumps and bumps better; that's why you'll find them at the track early in the morning and late at night, when nobody will be bothered by someone standing on or near the track.

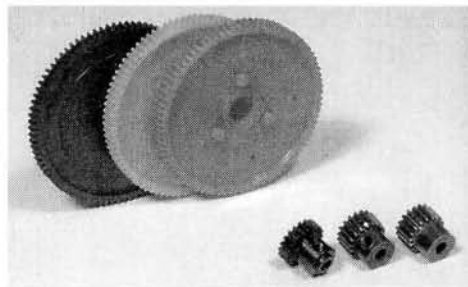
After your first run, go back to the pits and pick up your racing notebook. That's right; drop your radio and pick up your pen because you need to note the places where you seem to be dialed and those where you have problems. You may have real trouble in one area of the track, but it's unlikely that the car will be perfect everywhere else, so note every wiggle, push and poor landing. Some drivers prefer to draw a track diagram and make notes about the areas they're unhappy with.

Whatever works for you is OK, as long as you have enough information to sit down and apply some skull time to problem solving.



GEARING

Let's start with that situation on the straightaway: you're faster than some drivers and slower than others. How do you make sure that you get every ounce of horsepower from your motor to the ground? Assuming that you're in the highly competitive stock class and that your motor is in reasonable shape (and you haven't used some super-secret, borderline-illegal motor-tuning trick), gearing is a critical tool in your tuning box of tricks. You'll need to go beyond the traditional "One tooth up or one tooth down?" question commonly heard in the pits after qualifying rounds. Pick up a selection of spur and pinion gears that will allow you to move up and down the rollout range that may be right for your motor. A calculator and a little knowledge become your allies as you attempt to locate the "sweet spot" in your chassis/motor combination.



Measure your car's rear tire diameters with calipers (if you don't have any, see whether you can borrow a pair) and multiply that number by 3.1416; the result will be the tire circumference. Divide that figure by the number of teeth on the spur gear, then multiply by the number of teeth on the pinion gear you use. Finally, divide the result by the reduction ratio of your transmission. That final figure, referred to as "rollout,"

SPRINGS, SHOCK OIL AND SHOCK PISTONS

Gearing isn't the only thing that can affect your car's handling. There's a reason optional springs, shock fluid and pistons can be found in every winner's toolbox: these are the areas in which you make the most critical suspension-tuning changes to your buggy. It's not unusual to see top drivers go through several bottles of shock oil in a race weekend, especially while they practice during the days before the event. They juggle fluid, pistons and springs to combine ideal damping with resistance to bottoming until they get to the point at which they simply use their driving skills to overcome any remaining suspension problems.

That's right; there probably isn't a suspension-setting combination that's perfect for an entire track, or a killer setup that can be duplicated from track to track or car to car. Every driver has his

own style; every track has its particular set of challenges and every car its own idiosyncrasies. Sure, the factories recommend—and their team drivers start with—baseline setups that can get you around the track pretty well, but they're just starting points. Hey; if this were easy, everybody could win!

When you first build your car, note the baseline suspension information in your racing notebook. If the shock fluid supplied by the manufacturer doesn't have a viscosity rating (weight) on it, don't use it! You have to know where you are before you find out where you're going—right? If you do know, when you get to the track, you'll know what to change if you note handling difficulties. Let me give you some basic scenarios:

■ **If your shocks have thinner oil** (less damping) and softer springs, your car ...

- will generally work better through large bumps.
- will have more rear traction, but less steering (rear shocks only).
- will have more steering as you enter a turn, but less through the middle and the exit (front shocks only).
- will be less consistent over larger jumps.

■ **If your shocks have thicker oil** and stiffer springs, your car ...

- will react very quickly going through turns.
- will jump farther and will be less likely to bottom out on landing.
- may exhibit a tendency to spin out.
- will have more steering through the mid- and exit points of a turn.
- may "skim" over smaller bumps and ruts instead of getting caught in them.

It's important that you allow the front and rear suspensions to operate at similar rates. When you push your car's chassis down to the ground then allow it to rise on its own, the front and rear ends should rise at approximately the same time. If one end of the car is significantly stiffer than the other, inconsistent handling may result.

Here's a term you should learn: static damping. This describes the resistance of a shock at low speeds, i.e., how the shock feels when you compress the suspension by hand. The goal in suspension tuning is to find a good static damping feel and to stick with it. You'll know that your static damping is in the ballpark when your car quickly settles to its proper

represents the distance in millimeters or inches (whichever system your calipers are calibrated in) that your buggy travels for each rotation of the motor's drive shaft. Ultimately, this is the only figure that can help you out because spur size, pinion-tooth count and tire diameter can all change as you juggle things around to find the best setup.

As an example, let's say that your Associated RC10 has a stock motor, an 81-tooth spur and a 21-tooth pinion. With 73mm-diameter rear tires, your rollout would be:

$$73 \times 3.1416 = 229.34 \div 81 =$$

$$2.83 \times 21 = 59.55 \div 2.63 =$$

$$22.61 \text{ mm/rev—just a little low; that's why half the field blows by you on certain sections of the track where motors really get to wind out. You reach top speed at the middle of the straight, but the fast dudes are still cranking up additional velocity! Use spur gears in the 78-81-86-88-90 ranges and pinions running from 19 to 26, and march your way up the rollout chart 1mm at a time until the car feels just right, especially when compared with the competition. Trust me; you'll know when you're in the right place because the car will feel as if it has almost limitless acceleration, and you'll peg the throttle a whole lot less. Change the motor or the rear tires, however, and you'll have to start from scratch again. Tires aren't all the same size, and not all motors—even those of the same brand and model—have a powerband in exactly the same place. Just keep your calculator by your side, and keep taking notes about what works and what doesn't. Remember, it's not all about top speed: your spinouts may be caused by rollout that's too low, and failure to clear long double jumps may be an indication that a pinion is too large. If you're racing with a friend, time each other's laps so that you know whether you're headed in the right direction.}$$


ride height after you've dropped it onto your workbench from a height of 6 inches or so. If its chassis "slaps" the bench, the shocks are too soft; if the suspension fails to "give" when the car is dropped, the shocks are too stiff.

Once you have a good feel for your car's proper static damping, the next trick is to find the right shock piston for your track's conditions. You do this by changing the size of the piston's holes and then using a shock oil that provides that same, "ideal" static damping feel. For example: if you switch to pistons that have smaller holes, you'll need to



use a thinner shock oil. This is because the piston with smaller holes can't pass through the shock oil as easily as the large-hole piston. By using thinner oil, you can re-create that ideal static feel.

But why would you want to play around with shock pistons after you've found good static damping? There's a limit to how fast a piston can move through shock oil. The size of a piston's holes and the thickness of the shock oil determine the piston's "maximum speed limit" as it moves through the oil. If the shock were compressed faster than the piston's speed limit, the resistance of the shock would be greatly increased; it might even "lock up." Pistons with larger holes have a higher speed limit than pistons with small holes. Therefore, if you install large-hole pistons in your shocks, your suspension will be better able to cope with bumps and jumps taken at high speed. Smaller-hole pistons in your shocks improve cornering (because the shocks will limit chassis roll and brake dive) and jumping (your suspension will be less compressed by the face of the jump, and that will result in more height and distance).

OFF-ROAD RACING TIPS

CAMBER AND CASTER

Every time your car runs through a turn, the vertical angle of the sidewall changes with respect to the track's surface. This is caused by the chassis' leaning to one side or the other and by suspension geometry. You can use this to your advantage when you fine-tune traction and steering levels. In the rear, you should start with a baseline static setup of 1 degree or so of negative camber on both sides (pick up one of RPM's* excellent camber gauges to help you here). Increase camber $\frac{1}{2}$ degree at a time to make the top of the tire lean more toward the center of the chassis until you stop having traction problems in those ultra-tight high-speed infield corners; you'll know you've gone too far when the traction starts to go away again. Up front, additional



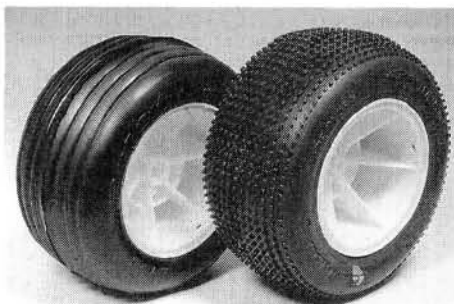
camber usually means additional steering, especially at the beginning of a turn. A starting point of 1 degree or so also works well, but you may find that $\frac{1}{2}$ -degree increments produce too dramatic a change for your taste.

You may also find that the suspension's designed-in mid-turn camber doesn't suit your driving style. To increase or decrease the rate of camber change during suspension travel, move the inner and outer pick-up points around by changing the locations of the ball links on the bulkhead and hub carriers. Suspension geometry is a tricky and complex subject; that's why the factories typically give you some guidelines on pick-up-point locations. A general rule is that an upper link that's the same length as the distance between the hinge pins on the suspension arm yields no camber change at all during travel; a shorter upper link results in camber change. Different upper-link pick-up points will result in different camber-change rates on different brands of cars; you should experiment to see what works for you.

Because every driver has a unique style, each has preferences with regard to caster settings (the angle at which the kingpin lies back from vertical). More caster typically means less on-power steering (like at the end of the straight) and more steering when you coast. Less caster (the kingpin is closer to vertical) usually results in more on-power steering—sometimes to a point at which the car is a little twitchy—and sometimes less steering when coasting through turns. Again, every brand is a little different. I tend to set my cars up with a lot of caster because I like a little push when I'm screaming through that first turn after the straight; I'm also paranoid about spinning out there, where all passing cars will take a piece out of you as they careen through. Almost every manufacturer offers optional caster settings. Most of the time, you adjust caster by changing the steering spindles.

BALANCING FRONT AND REAR TIRES

It's important to make sure that the front and rear tires you want to use are somewhat compatible. All fronts don't work with all rears, and this is why drivers at bigger races usually use tires from the same manufacturer at both ends of the car. Most manufacturers can recommend matching fronts and rears to suit your setup, track conditions and driving style. You'll



know when you've mismatched front and rear tires because one end will have much more traction than the other. If you have to deal with a major push, the rears are getting too much dig, or the fronts are skating over the surface instead of biting in and giving you steering. If your car spins out too easily, the fronts are biting too hard, or the rears are skipping.

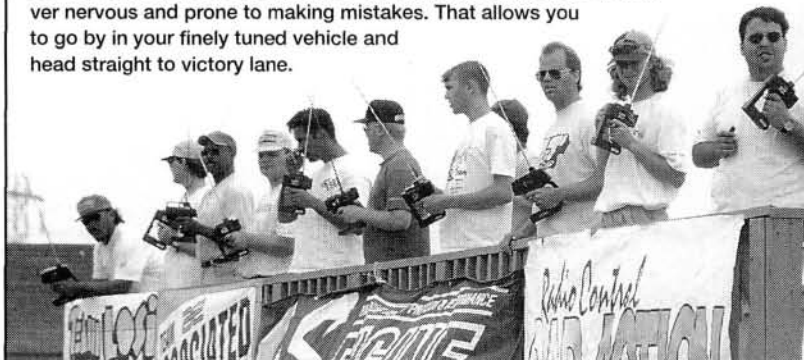
Whatever you do, don't change both ends at the same time! For instance, to deal with the push, first go to a rear tire with less traction (too much traction slows you down), then head back out onto the track and see whether that does the trick. Still too wide in the turns? Try tires with smaller pins (less traction) on the rear, or fronts with more traction. I tend to go with progressively looser tires (less traction) out back until I think I've gone a step too far; then I go back one.

If I've conquered the push but I still want more precision when entering the turn, I change the fronts. There are so many neat front-tire designs that it's easy to find one that's just perfect for your style. Remember the stopwatch! A tire that feels weird may actually be faster than one that makes you feel fast.

DRIVING TIPS

Finally, let me offer you three pieces of driving advice:

- First, all the setup work in the world can't replace practice time, both with other cars on the track and all by your lonesome. Unless you're completely comfortable with your car and know exactly what it will do when you yank the throttle and turn the wheel, you'll never see the winners' circle.
- Second, the throttle works both ways. Sometimes, you have to travel difficult sections of the track at less than top speed because there's simply no other way to get through them cleanly; good track designs challenge you that way. If you want to get through the turns quickly, you have to avoid bouncing off the outer barriers.
- Third, learn how to follow other drivers. Catching up to someone (especially during practice) doesn't ensure that he'll immediately move over and let you go by. Watch the fast, fast, fast guys on the track, and you'll see that they often—sometimes, for all 4 minutes—follow one another as closely as they can in a line of five or six cars that seem tethered by a short string. These guys are learning one another's lines, watching for weaknesses that may allow them to pass during qualifying and playing a psych-out game that goes like this: make one mistake, and I'm not just all over your behind, I'm past it! Sometimes, following another car very closely but not bumping or tapping it will make the other driver nervous and prone to making mistakes. That allows you to go by in your finely tuned vehicle and head straight to victory lane.



*Addresses are listed alphabetically in the Index of Manufacturers on page 200. ■

WHAT'S new

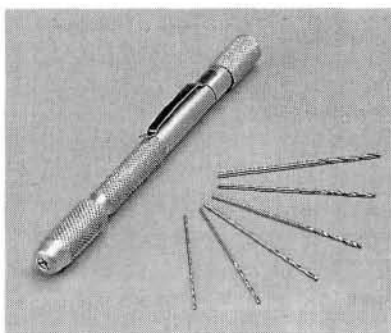
PARMA

Ford Mondeo Body

This slick new body for touring cars is 7.5 inches wide and includes a racing wing for high speed, stability and solid cornering. The Mondeo is available for Tamiya and Yokomo sedans.

Part no.—10184; price—\$18.

Parma/PSE, 13927 Progress Pky., North Royalton, OH 44133; (216) 237-8650; fax (216) 237-6333.



HOBBICO

Pin Vises

These tools are ideal for a variety of modeling purposes. They feature textured grip handles and pocket clips for ease of use and transportation. The pin vise is available in two sizes, with collets that fit a variety of drill-bit sizes: one comes with six bits and handles bit sizes from 52-80, and the other comes with three bits and handles bit sizes from 30-51. The servo-horn drill makes it easier to drill non-tapered holes so that Z-bend wire and clevis pins both fit and perform better. The tool's smallness makes it perfect for use in tight spaces.

Part nos. and prices—HCAR0696 (52-80 w/6 bits), \$11.99; HCAR0697 (30-51 w/3 bits), \$11.99; HCAR0698 (servo-horn drill), \$3.99.

Hobbico; distributed by Great Planes Model Distributors, 2904 Research Rd., Champaign, IL 61826-90021; (217) 398-6300; fax (217) 398-0008.

BATTERY WORKS

Celtronic Ni-Cd Recycling System

Maintain control of your car on the track by reconditioning your batteries with this battery-saving system. It helps revitalize your batteries by wiping out past memory and re-energizing them to standard—or higher—voltage. This will help your car get better starts when you use older cells. For best results, use the system for R/C applications in conjunction with the factory-supplied charger.

Part no.—CNR-1; price—\$139.

Battery Works, 525 S. Calapooia, Bldg. 2-A #F, Sutherlin, OR 97479; (541) 459-5550; fax (541) 459-5650.



HITEC RCD

Micro Ball Bearing Servo

This new microservo from Hitec offers 52 ounces of torque with 0.14-second transit time (4.8V) and has 65 oz.-in. of torque at a 6V rating. This tiny servo weighs 1.1 ounces and is perfect for 1/12-scale and other tight-fit applications.

Part no.—2258B; price—\$49.95.

Hitec RCD Inc., 10729 Wheatlands Ave., Ste. C, Santee, CA 92071; (619) 258-4940; fax (612) 449-1002.



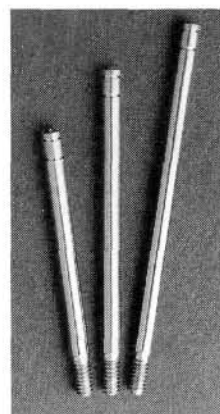
MIP

Golden Shock Shafts

MIP's renowned Golden Shock Shafts are now available for 1/10-scale touring cars. These shafts are precision-machined of stainless steel, highly polished and coated with high-quality titanium nitride for smoothness and durability. The ends have been rolled with a sharp thread that bites into plastic shock ends for a truly secure hold. The shafts are available for HPI and Tamiya sedans.

Part nos.—1046 (for HPI sedans), 1045 (for Tamiya sedans); price—\$3.99.

MIP, 746 E. Edna Pl., Covina, CA 91723; (818) 339-9008; fax (818) 966-2901.



SERPENT
**MEGA
SX-21**

ABC Sets with Conrod

These two new piston and sleeve sets offer better bottom power than was previously available. The Ev2 5P has a new piston/liner configuration that's suitable for use on shorter, simpler tracks and helps your engine get better fuel economy. The Ev2 7P offers good bottom power and great high-end power; it was designed for use on longer, more elaborate tracks and helps provide better cornering speeds.

Part nos. and prices—2726 (Ev2 5P), \$220.95; 2727 (Ev2 7P), \$236.95.

Serpent USA, West Park Center, 2832 NW 79th Ave., Miami, FL 33122; (305) 639-9665; fax (305) 639-9658.



SCHUMACHER

**Formula 17 and
Formula 27
Stock Motors**

Get great performance at a low price with these two new stock motors. The Formula 27 offers 22 degrees of advance, is BRCA-legal and is the ideal replacement for standard kit motors. Install the Formula 17, and you'll think your car is brand-new again. (These motors are not yet ROAR-approved.)

Part nos. and prices—G207D (Formula 17), \$27.95; G208D (Formula 27), \$25.95.

Schumacher Inc., 6302 Benjamin Rd., Ste. 404, Tampa, FL 33634; (813) 889-9691; fax (813) 889-9593.



KAWADA

SV-10 4WD Touring Sedan

This new touring car has multiple features: "dial in" front caster; a front shock-absorption mechanism that protects the front end from crashes; a low and centered motor mount; a rear body mount that's linked to the rear suspension to help prevent the body from coming into contact with the track or parking lot; a Quick Release Battery Holder with three easily changed battery positions; and a front body mount with low-angle dampers to accommodate a low-profile body.

Part no.—SV-10.

Kawada; distributed by Sunrise R/C Ltd., 1703 Utah Ct., Milton, WA 98354; (206) 874-8508; fax (206) 838-7603.

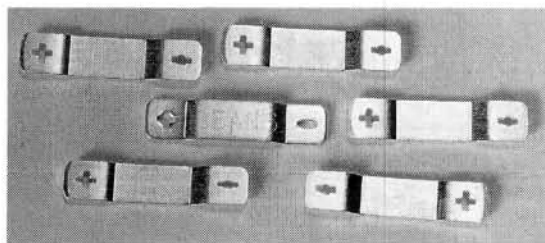
W.S. DEANS

Probar 2.0

This battery bar was specifically designed for use with Sanyo RC-2000 cells. Precision-stamped of high-grade copper and plated with pure silver, the bar ensures maximum power, strength and ease of soldering. The Probar is available in 6-, 25- and 100-piece sets.

Part nos. and prices—1600 (6-piece), \$3.95; 1601 (25-piece), \$10.95; 1602 (100-piece), \$39.95.

W.S. Deans Inc., 7628 Jackson St., Paramount, CA 90723; (562) 634-9401; fax (562) 634-9403.



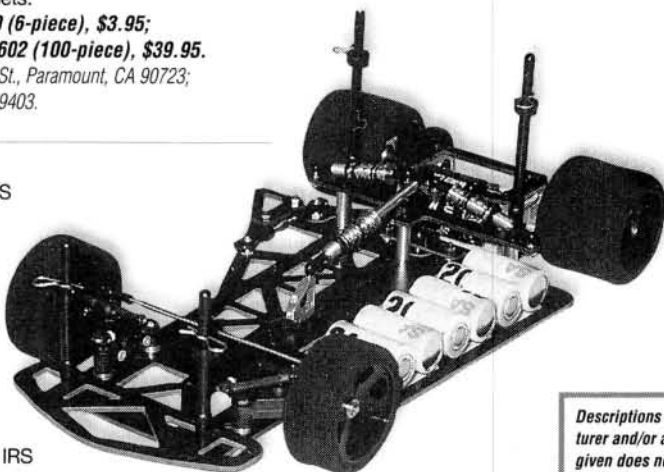
SAVAGE MOTORSPORTS

Head Hunter

This new chassis is made of 0.110-inch-thick carbon fiber for strength and rigidity. The kit comes fully loaded with performance-enhancing features that include adjustable offset, roll center and wheelbase; IRS diff assembly, Lunsford titanium motor-pod link, Raceway Mfg. center shock mount, large-volume shocks and new center-shock extension piece, Associated front end and carbon-fiber nerf wing and bumper.

Part no.—HS300; price—\$399.95.

Savage Motorsports; distributed by World Class Batteries, 8021 James Ct., Niwot, CO 80503; (303) 684-9450.



ASSOCIATED

New Team Tool Kit

This three-piece, multi-use molded tool set serves as a steering turn-buckle adjustment wrench, a $\frac{3}{16}$ -inch 10L camber-adjustment turn-buckle wrench, a wrench sized to fit Associated shock caps and a wrench to hold your shock body securely during building and maintenance; it also has two sockets that fit front and rear wheel nuts.

Part no.—6956; price—\$4.50.

Associated Electrics Inc., 3585 Cadillac Ave., Costa Mesa, CA 92626; (714) 850-9342; fax (714) 850-1744.

Descriptions of the products shown here were taken from manufacturer and/or advertising agency press releases. The information given does not constitute an endorsement by Radio Control Car Action or guarantee product performance or safety. When contacting a manufacturer about any product described here, be sure to say you read about it in Radio Control Car Action. Manufacturers! To have your products mentioned here, send press releases to R/C Car Action, What's New, 100 East Ridge, Ridgetfield, CT 06877-4606.

Tuning and Modifying the

KYOSHO MP-5

by Frank Masi



WHEN MY local off-road track created a class for 1/8-scale gas buggies, I enthusiastically pulled my Kyosho* Inferno MP-5 out of storage and gave it a once-over to evaluate its race-worthiness. Despite being two years old, Kyosho's MP-5 is still state of the art and capable of winning at any level. Now Kyosho has released a few updated suspension and chassis parts that should elevate this two-time world champion's performance to an even higher level. Additionally, several other manufacturers have introduced MP-5 hop-ups that I felt would complement this already complete racer.

■ The first item I added from Kyosho's large catalogue was the Special Main Chassis (part no. IFW-1). This thicker (3mm), hard-anodized, duralumin, direct replacement for the stock chassis provides a stronger backbone and better resists side flexing; both enhance the suspension's ability to cope with the track surface.

To further increase chassis rigidity, I installed some graphite replacement parts from GPM*. Their carbon-fiber radio plate (GMP011), center differential brace (GMP012) and front steering brace (GMP049) are both lighter and stiffer than the stock aluminum pieces. Plus, carbon-fiber always looks trick!

The center diff of the MP-5—of any nitro buggy, for that matter—is the heart of the drive train and is subjected to enormous forces. The MP-5's molded-nylon center diff mounts flex a little, so I replaced them with a set of anodized-aluminum mounts from GPM (MP038).

The mounts are attractive, but I was not pleased with their quality: they permitted too much end play when the center diff was installed, and the threaded holes for the 3mm machine screws that secure the brake pads were far too large. I had to use a combination of

thread-lock and CA to prevent the screws from wobbling. The mounts now work well and look great, but if I were re-doing this project, I'd instead use Kyosho alloy mounts (IFW-8) because they're more precisely machined.

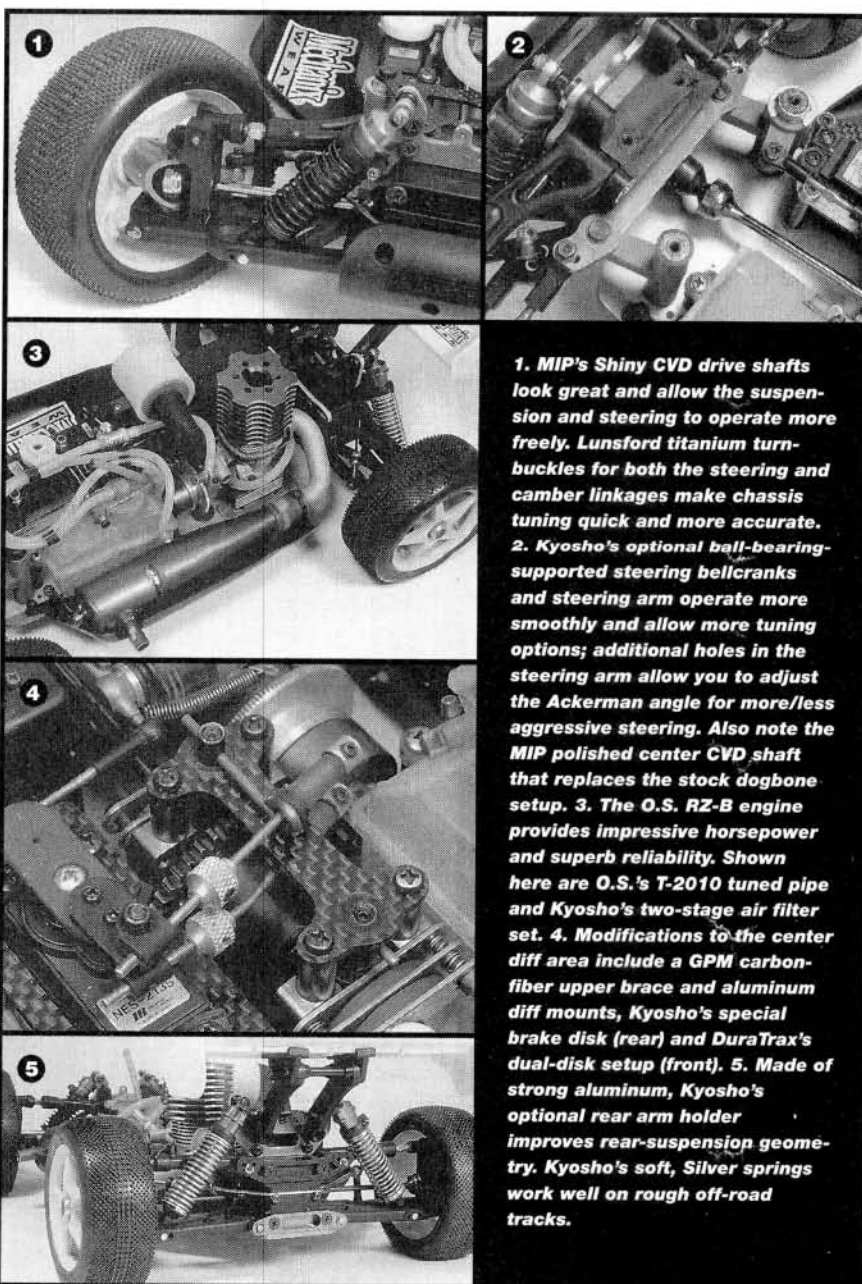
■ Since the MP-5 comes standard with O-ring-sealed differentials (but no oil to fill them with—puzzling), you must choose the viscosity that best suits your track. After lengthy discussions regarding gas-car diffs with Cliff Lett—Associated's chief designer, who also races an MP-5—I came to the conclusion that lighter oil is almost always better. Cliff maintains that 1/8-scale cars are always "diffing," i.e., the diffs are always working hard. Usually, the gas buggies that handle most erratically are the ones with diffs that are too tight. I usually run lighter silicone oil in the front and rear diffs (no thicker than 50WT) and almost always fill the center diff with 10WT oil. On slick tracks, thicker oil in the center diff provides faster acceleration and more front-wheel drive, but a center diff that's too tight will cause erratic handling through the bumps. Cliff's words of wisdom ring true: "I always set my car up for the worst, bumpiest conditions. I may not be the fastest when the track is smooth, but toward the end of the race when the track is torn up—and this always happens in eighth scale—I'm dialed."

When filling the diffs, I found that I could prevent the oil from leaking by applying some Permatex Form-A-Gasket (available at auto parts stores) to the threads of the diff case's setscrew. I also used this method to prevent the screws that secure the gear cases to the chassis from backing out. Try it; it works great and won't attack plastic.

■ The addition of Kyosho's Steel Main Gear (IFW03) should be considered mandatory. This hardened-steel, 46-tooth replacement for the kit's molded-nylon gear is virtually bulletproof, and its thin profile provides less friction against the clutch bell.

For additional stopping power, I installed a DuraTrax® dual-disk brake system in the front and Kyosho's Special Brake Disc (BSW52) in the rear. To ensure adequate brake-disk clearance, you'll need to use Kyosho's double-disk flywheel (IFW11 [for O.S.]). To prevent the dual fiberglass front disks from causing drag when not in use, I installed four tiny springs that are available through OFNA*.

MIP* now offers their famous CVD drive shafts for 1/8-scale cars. I installed a pair of their new Polished CVDs at both ends of my MP-5, and I replaced the stock kit's dog-



1. MIP's Shiny CVD drive shafts look great and allow the suspension and steering to operate more freely. Lunsford titanium turn-buckles for both the steering and camber linkages make chassis tuning quick and more accurate. 2. Kyosho's optional ball-bearing-supported steering bellcranks and steering arm operate more smoothly and allow more tuning options; additional holes in the steering arm allow you to adjust the Ackerman angle for more/less aggressive steering. Also note the MIP polished center CVD shaft that replaces the stock dogbone setup. 3. The O.S. RZ-B engine provides impressive horsepower and superb reliability. Shown here are O.S.'s T-2010 tuned pipe and Kyosho's two-stage air filter set. 4. Modifications to the center diff area include a GPM carbon-fiber upper brace and aluminum diff mounts, Kyosho's special brake disk (rear) and DuraTrax's dual-disk setup (front). 5. Made of strong aluminum, Kyosho's optional rear arm holder improves rear-suspension geometry. Kyosho's soft, Silver springs work well on rough off-road tracks.

SETUP

Kyosho Inferno MP-5 Setup Sheet

Surface: dry and bumpy; hard-packed in the turns

FRONT END

Shock oil 30WT Associated
Pistons 2-hole/1.3 diameter (black)
Ride height Drive shafts
slightly below level
Toe-in/-out 1 degree
toe-out (at ride height)
Camber 2 degrees negative
Upper arm position Upper hole (inside)
Swaybar Yes
Diff oil used 3,000WT Kyosho

CENTER DIFF AND BRAKES

Diff oil used 10,000WT Kyosho

No. of disks Dual fiberglass
front/carbon fiber/rear
Amount of play 1/32-inch

REAR END

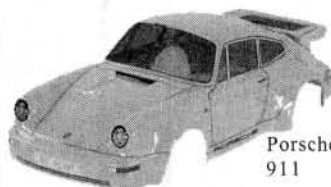
Shock oil 25WT Associated
Pistons 1-hole/1.6 diameter (white)
Toe-in plate used Blue
(1 degree per side)
Camber 1 1/2 degrees negative
Ride height Drive shafts
slightly below level
Upper arm position Inner—lower hole;
outer—upper hole
Swaybar Yes
Diff oil used 5,000WT Kyosho

NEW!

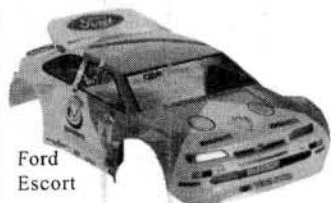
1:8 Sedan Bodies



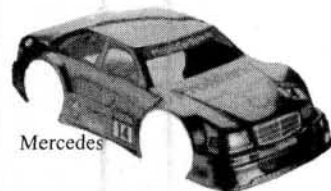
Opel
Calibra



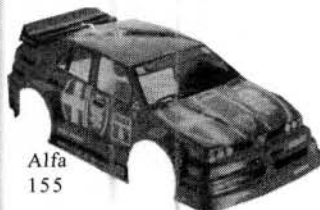
Porsche
911



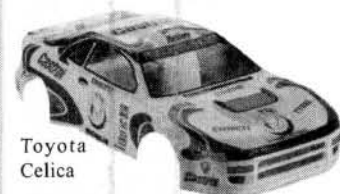
Ford
Escort



Mercedes



Alfa
155



Toyota
Celica

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Info: All these bodies are designed to fit 1/8 scale off road cars, such as Inferno, Mugen, Hodr, ect.

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2ND LOOK: KYOSHO MP-5

bones with Polished Center CVDs for smoother power transfer.

■ For smoother, more precise steering, I installed Kyosho's Ball raced Servo Saver kit (IFW4) in place of the kit's bellcranks. I also installed Kyosho's Special Steering Plate (IFW14), which offers a choice of two steering-link positions so that you can adjust the car's Ackerman to provide more or less aggressive steering response.

I retained the stock kit's rear swaybar and added Kyosho's optional Front Stabilizer Set (IFW05) to further limit chassis roll during cornering. This modification does take away some low-speed steering, but I've found that the MP-5's improved front-suspension geometry provides more than adequate steering.

In the rear, I installed Kyosho's new rear suspension holder (IFW16). This anodized-aluminum piece is stronger than the stock plastic one and provides 1 degree of rear toe-in per side. Kyosho also makes a holder that provides 2 degrees of toe-in (IFW17). More rear toe-in generally increases rear traction, but reduces steering. On slippery tracks or very long, sweeping ones, I'll use the 2-degree plate. For my local track, which is somewhat small and tight, I like the 1-degree plate because it makes it easier to slide the car through turns.

Incidentally, to ensure the proper anti-squat angle, you'll need to use Kyosho's special rear suspension plate (IFW15), regardless of which rear-arm mount you choose.

■ The stock MP-5 shocks are awesome. After many races, they show only minimal signs of wear, and their rubber shock-shaft seals keep all dirt away from the critical shock seals. When I eventually changed shock oil (after about four races), it was as clear as it had been on the day I poured it into the shock. In the rear shocks, I retained the kit's one-hole, 1.6mm pistons, but up front, I installed Kyosho's optional two-hole, 1.3mm pistons (IFW19) for more "pack." I initially used Associated 30WT silicone oil in all four shocks, but I later changed to 25WT in the rear shocks only for better rough-track handling.

I kept the black, medium-firm springs for the front shocks, but I found that the soft, silver springs from Kyosho's optional spring set (BSW76) made the car much more stable on bumpy tracks.

Adjusting camber angle and front-wheel toe-in using the MP-5's stock, threaded rod can be time-consuming and inaccurate. To save weight and to make for easier tuning, I installed a complete set of Lunsford* titanium turnbuckles. The set includes rods for the steering linkage and both front and rear upper camber links. For additional weight savings, I also replaced the steel hinge pins with a full set of Lunsford's titanium hinge pins.

■ Motivation for my Inferno comes from an O.S.* RZ-B .21 buggy engine with Kyosho's no. 39514 manifold and an O.S. T-2010 tuned pipe. This engine has over one full season of racing on it and is only now beginning to show signs of piston/sleeve wear.

I use an Airtronics* Caliber 3Ps radio and 27MHz FM receiver along with two Airtronics 94158 servos. You need strong servos for an 1/8 gas buggy, and the 158s are both strong (over 100 oz.-in. of torque) and quick.

PERFORMANCE

So far, I've raced my MP-5 nine times over 11 weeks. It won seven races, finished second once and met a fence pole after leading for nine minutes of a 10-minute main event. The O.S. engine has performed flawlessly and has needed only two glow-plug changes. Aside from a broken clutch spring and front suspension damage caused by a full-speed jump into the aforementioned fence pole, my MP-5 has never failed to finish a race.

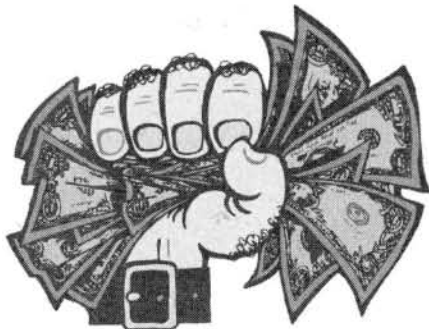
Our club track was designed for 1/10-scale off-road vehicles, so it's a little tight for the larger, 1/8-scale cars. Regardless, we've managed to run 10-car heats and mains on it with little problem; it just gets really busy out there! I've been using Byron's* race fuel (15 percent nitro) and have found that it provides more than enough power for our track. Some racers like to use fuels containing higher nitro percentages (up to 30 percent), but I think that doing this shortens the life of the engine's piston and sleeve. Maybe high-nitro fuels are needed at top-level events, but for club racing, I say stick with less nitro.

The MP-5 likes soft damping and loose diffs—especially on tight, bumpy tracks. It's also the first 1/8-scale buggy I've owned that doesn't push in the turns. I have two sets of mounted tires for my MP-5; the stock, X-pattern, hard-compound tires and a set of Kyosho's super-soft W5647S Microblock tires. The Microblocks provide tons more grip, but I often use the harder X-pattern tires because they allow the car to slide through the turns, and they are less likely to snag on ruts and bumps, which could make the car flip.

Racing the MP-5 is an absolute blast. It's very easy to drive and to maintain, and it's also reliable and durable—even more so with the addition of a few mod parts. As long as there are other gas buggies to compete against, I'll be racing this puppy until the snow falls.

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ROAR ON-ROAD NATIONALS

(Continued from page 121)

McMahon paced this 4 minutes' worth and saw contenders Jared Scott and Vicky Carrubba drop out because of mechanical problems. Cooper and McMahon ran 14 laps on their way to first and second. Third and fourth were Tom Esposito and Jeff Flassig with 13 laps.

• A2. Scott and Carrubba rebounded nicely, while Al winner Cooper slid rearward slightly. His ninth-place finish wrecked his chances for the overall win, but McMahon, Carrubba, Scott and Esposito were still in with a chance. The finish was Scott, Carrubba, Esposito and McMahon.

• A3. A single lapped car made the final main a nail biter. With less than 20 seconds left, several of the top runners bunched up behind a back marker on the infield part of the track. McMahon, Carrubba and Joe Barbera cleared the marker and made an extra lap, and at the end, it was McMahon, who took the win and the stock title, Carrubba in second and the runner-up in class, and Jared Scott in fourth place—good enough for third overall in stock.

Modified 1/10-scale

• A1. In the first heat, a big crash started the action, but once the smoke had cleared, Johnson, Cyrul and Swauger paced the race. Over the 4 minutes, Johnson extended his lead and turned the only 16-lap time. At the finish, it was Johnson, Cyrul, Swauger and Wynn.

• A2. For the first 2 minutes, Swauger stayed close to Johnson, but after that, it was Johnson's purple-and-white Trinity all alone in first. Heavy traffic made for some tough passing, but Johnson again got in 16 circuits on his way to the win and the championship. Swauger cruised to second followed by Orr, Cyrul and Wynn.

• A3. Although Johnson had the overall win in his pocket and sat out the third heat, the rest of the spots were up for grabs. Over half the field still had a mathematical chance at second place, and nobody held back! For much of the run, only 4 seconds separated the top four, and at the end, it was Swauger first, Wynn second, Cyrul third and Orr fourth. Mike's A3 win secured the runner-up position in the nationals while Cyrul just edged out Wynn for third.

4WD Sedan Stock

• A1. The shocker was the no-start of TQ winner Rudy Rodriguez. Arthur Tsui and David Hatcher were also no-shows, so only seven stock touring cars made it to the grid. Pan-car standout Scott and Schumacher driver David Franklin paced this race with 12-lap runs, while Bill Hagen and Joe Barbera tussled over third and fourth.

YOKOMO YR-4 II

(Continued from page 96)

• A2. Rodriguez rebounded, but Franklin was just a bit faster. The two provided the two 12-lap runs, and Franklin edged Rodriguez by 4 seconds. Second through fifth went to Tsui, Hagen, Barbera and Niki Kwong.

• A3. Although three cars reached the 12-lap mark, any car in the field could have won the national championship. Hagen, Rodriguez and Scott aced out Tony Padilla, Tsui and Joey Lundbergh for the point, while Franklin made only eight circuits. This had the crowd wondering right to the end who would capture the stock sedan class! Once the dust had settled, Franklin was the ROAR champ followed by Hagen and Scott.

Modified Sedan

• A1. TQ Baker and Johnson paced the early part of the first heat with Jun right on their tails. Baker spun and Johnson got tied up, but Jun steered his Tamiya sedan around them and into the lead. The two Johnsons, Joel and Jack, chased Jun to the end, but at the buzzer, he put the win in his pocket.

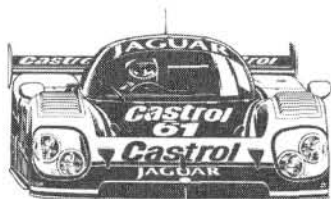
• A2. Jun took the point early with Chris Tosolini and Joel in close pursuit. This Jun-Johnson-Tosolini freight train lasted during the whole race. J.R. Mitch, Ron Rossetti, Scott Ernst and Wynn ran tightly with only about a second between them. At the flag, Jun took the win and ROAR title, much to the delight of the crowd—and Jun, too!

• A3. While Jun savored his victory, the rest of the 4WD sedans battled to fill the rest of the podium spots. Baker, Joel and Tosolini broke away first, but Mitch wasn't far behind. Baker spun twice, and this allowed Joel to lead the rest of the way. Baker and Tosolini fought over second, and Baker claimed it at the flag. Joel's win put him in second overall in the National, followed by Baker.

FINAL THOUGHTS

The Southwestern Florida RC Raceway staff and crew did an excellent job of running this event. Though many were surprised that Joel Johnson didn't have a three-mod-class sweep, everyone was pleased with David Jun's modified sedan class victory. And the weather could have been worse; there could have been a hurricane!

*Addresses are listed alphabetically in the Index of Manufacturers on page 200. ■



the run, I made a U-turn, and got back on the gas with the Yoke barreling toward me. I wanted to get a close look at the car as it made a fast, hard, 90-degree turn right at my feet. As the car whistled in, I cut the wheel and then countersteered to set up the now sideways YR-4 II for the entry into the turn. When I got back on the gas and tried to straighten it out, the car broke loose, and I had to jump over it or else take a 3-pound shot to the shins. No thanks!

Clearly, the YR-4 II did not respond well to my cut-and-thrust driving technique. The fast way around my L-shape course was to dial in a little drag brake and drive the car, not pitch it. The YR-4 II proved the old "loose is fast" adage; it snaked around turns with just a little drift and a lot of speed. On courses with a lot of hard braking and rapid direction changes, however, the Yoke can be a handful. I suspect the culprit is undamped chassis flex; as the car enters a turn, the turning forces "load" the chassis, storing energy like a compressed spring. When the car changes direction, the chassis "unloads," suddenly releasing the stored energy and upsetting the dynamics of the suspension as it tries to cope with the new cornering forces. The car then breaks loose. Unfortunately, the chassis flex is fixed. The shock absorber on the top plate adjusts only the

initial load required to flex the chassis fore and aft; it has no effect on torsional forces. I suspect that the optional graphite chassis will be the hot setup, as it should be less flexible and will therefore store less energy. I'd like to see a "Second Look" on this car, for sure!

FINAL THOUGHTS

The Yokomo YR-4 II will reward certain deft drivers with faster lap times, I am certain. For a ham-fisted driver like me, the car is not ideal—at least, not right out of the box with only a few packs run through it. I mentioned that I would like to try the graphite chassis, but you know which upgrade would really make this car sing? Track time. Yep, good ole practice. Driving the YR-4 II reminded me of the many times I've taken the wheel of a car that had just handed me my butt on the racetrack and then had to ask its owner, "How the heck do you drive this thing? It's so loose!" The fast setup isn't always the easy-to-drive setup, and the Yokomo is definitely fast. It's also very high quality and a "fun" build. Oh, yeah; my big question: "Does it work?" Well, by the time this is published, I bet the answer will be, "Ask the world champ."

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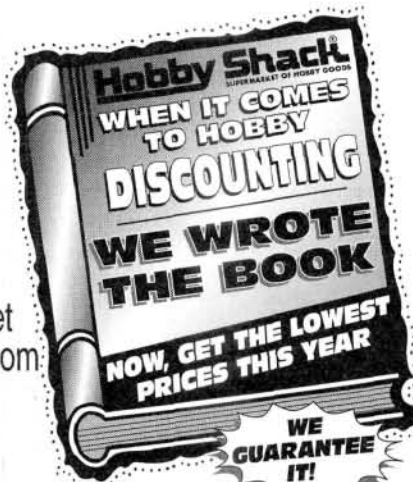
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MRC VORTEX

(Continued from page 84)

lack of down-travel prevented the wheels from dropping into dips and ruts without disrupting the attitude of the chassis. The Vortex proved itself a good jumper, as long as nose-down landings were avoided; the jutting front bumper tended to dig in and loop the car if the angle of attack was too steep. Faring least well was the three-step mechanical speed control. The fine grit of the ground-stone track quickly fouled the unit's contacts, creating annoying dead spots. If the throttle trigger wasn't held in just the right spot, the Vortex was a no-go. Cleaning the contacts cured the problem, but doing this after each pack got old quickly.

To recap: the Vortex is fun in the front yard, jumps like a frog and can get around a racetrack with a little extra "english" at the wheel. Good. Nice car, end of review; thanks, MRC. Uh-oh, wait a minute: let's talk durability. Let's put the "thrash" in this Thrash Test. Let's get medieval on this car—because that's what every beginner will do! To test the extremes of the Vortex's "hack envelope," I headed off to the local industrial park for loading-dock runs. Loading-dock runs? At this particular site, the loading docks are inclined, like ramps; the pavement gently slopes into the loading area, and this makes possible perfect roller jumps that can really

launch a car. With five loading docks the length of the building, you can get a nice rhythm going. The long-travel Vortex took to the loading docks easily; it gracefully bounded into the dock and launched out the other side. That was only a warm-up, though; I only used the first couple of feet of the loading dock where the jump area's incline was mild. The deeper you go into the dock, the higher the jump—waist high, in some cases. This is where race-day-ending damage could occur, and this is where the Vortex was headed next. With a good head of steam, the Vortex dropped into the first dock, and I do mean dropped. The entry was too steep for the car to stay planted, so it simply fell 3 feet to the pavement below—ouch! The rear of the chassis slapped down hard, but the Vortex raged onward, up and over the big 3-foot roller. Hang time was eternal, and the landing was smooth. The Vortex saw plenty more air time and had some major crashes that severely taxed it. In one instance, the car landed hard upside-down, sans body and wing (I was saving them for the photo shoot). The shock towers got a little chewed up, but nothing broke—amazing. The front suspension arms took some very big hits as well, but they never broke. As a matter of fact, only

one part failed after all that abuse. During a string of cartwheels that followed a botched landing, the front left suspension arm was yanked down hard enough to rip the shock shaft out of its ball end. After I tracked down the jettisoned spring and spring perch, I just screwed the shaft back in and kept on a-runnin'. I understand why MRC offers a free crash-replacement warranty; the Vortex is tough!

FINAL THOUGHTS

I like this car! The Vortex is durable, thoughtfully designed and out-of-the-box fast. It's also inexpensive and convenient in its ready-to-run form—two major prerequisites for first-timer success. Don't peg the Vortex as a mere beginner-mobile, however; I encourage anyone who has racing aspirations to go ahead and upgrade the Vortex to their heart's content. I don't think race-worthiness is important for an entry-level car, but it is a testimonial to the Vortex's quality. Having fun, now that's important. MRC definitely has nailed the fun factor, so now it's your move; are ya gonna jump into R/C, or what?

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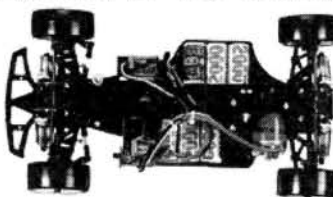
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TECH RACING VOGGERD

(Continued from page 105)

I also unintentionally tested the car's ruggedness when I took my eye off it for a split second and ran it into a curb at full speed. Amazingly, the only damage was a scraped body. I also managed to sideswipe a few curbs; this removed a few decals, but the Voggerd kept on running strongly. Overall, I'm impressed; the Tech Racing Voggerd T-10 has all the elements of a true R/C racing car.

FINAL THOUGHTS

As you probably have figured out by now, the Voggerd T-10 is definitely not for beginners. It's a handful to build, and the endless suspension adjustments may be extremely intimidating for some racers. After I had everything working properly, however, the car was dialed. In addition, it's extremely rugged, which I think is a must for touring-car racing. I also like the fact that the suspension pieces are interchangeable; this means that I need to carry along a only few spare parts.

The Voggerd T-10 definitely falls in the exotic category, so if you're like me and love the unusual, I would definitely give this car a hard look. Expect to see the Voggerd priced just under the HPI RS4 Pro—not a bad price for an exotic!

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Uses for the otherwise useless

There are times when you should pry open the wallet and spend with confidence and peace of mind. This is most definitely true in the case of tuned mufflers. Accordingly, it is my humble opinion that you should arrange "alternate plans" for that small expansion-chamber muffler and long extension tube at the earliest opportunity. While it

limits the power of your engine, the expansion chamber by itself is harmless enough—if you run your engine rich enough. They did work fine for airplanes, but those applications are subject to far more air cooling than car applications.

The evil partnership of an expansion-chamber muffler plus a long extension tube, however, is a recipe for heat,

reduced power and, worst of all, dramatically shortened engine life. I've said it

before: our engines are liquid-cooled. The oil and unburned alcohol that pour out of the exhaust carry away a tremendous amount of internal heat. For optimum cooling of this type to occur in a 2-stroke-cycle engine, you must let the thing breathe freely!—unrestricted breathing on the exhaust side, to be more specific. In short, the expansion-chamber/extension-tube setups that

Stress therapy

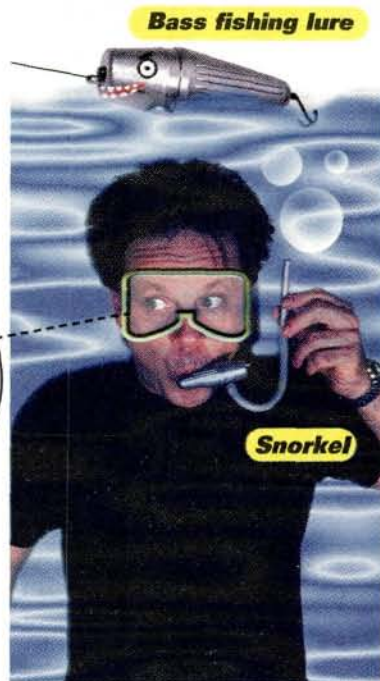
often come as stock equipment with a car kit inherently have too much backpressure. These things should never see the light of day on our cars because in the type of engines we run, backpressure spells one thing: dangerous heat build-up. That's why I feel a good tuned-pipe/muffler system should be added even before you ever fire up a new engine. If you plan to spend any money on hop-ups, guys, here's the place to start—even before you add ball bearings or better shocks.

I would love to see kit manufacturers stop including what I feel are useless and potentially harmful muffler systems and start including a tuned system, even if it costs a few dollars more. To me, a tuned system is \$\$\$ in the bank. Some manufacturers are already doing this, and I salute them. Most always strive to do the right thing, and I predict you'll be seeing more of this in the future.

The bottom line is this: a good tuned-pipe/muffler system can make running glow engines so much more enjoyable and rewarding. They boost performance, and they do it while increasing engine longevity! What more could you guys ask for? Don't tell me; I know: free fuel. ■



Bubble pipe



Bass fishing lure

Snorkel

Damage Control

For a few dollars more.

Simply put, tuned pipes like the MIP Stinger shown here are "tuned" to the harmonic resonance of your engine's piston at a specific point within the torque band. At a certain point, a standing wave develops in



the pipe, which resonates with the piston's opening and closing. This resonance actually keeps fresh mixture in the combustion chamber and prevents it from escaping into the pipe as the piston closes for firing (thereby increasing performance) and pulls out hot exhaust gas as the piston opens after firing (thereby extracting heat for improved cooling). Some even call tuned pipes "extractors" because of this feature. They in fact do extract burnt gases, which are extremely hot. When an engine is running right, we say it's "on the pipe." If you're British, you'd put it this way: "I say there, old chap! Why, I do believe the machine is 'on-song,' by Jove!" I know, the Brits can be way out there with the way they put things, but I must agree that the musical reference is far more accurate and descriptive. The parts of the machine (the pipe and the engine) are, in fact, in tune with one another in a strictly literal sense. Just remember this: when the guitars are in tune, the band rocks!

This is my page—mine!

The opinions expressed on this page do not necessarily represent the opinions of the entire Car Action staff. Any resemblance to reality is purely coincidental. Send your correspondence, hate mail, love letters, photographs—anything you like—to Chris's Back Lot, c/o R/C Car Action, 100 East Ridge, Ridgefield, CT 06877-4606. My Internet address is: chrisc@airage.com.

